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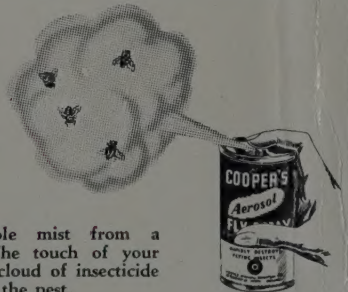

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NEW ZEALAND JOURNAL OF Agriculture

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This Month's Cover

A prospective Christmas dinner for a large family forms the subject of this month's cover, which has been reproduced from a colour photograph by Tom Lloyd taken on a specialist turkey farm near Waimate in South Canterbury. About 2500 turkeys are raised for table annually on this farm. The gobbler is an excellent specimen of the American Mammoth Bronze breed, breeding males of which may weigh 30lb. or more. Though specialised turkey raising is not much practised in New Zealand, more interest is now being taken in raising good-quality birds for local consumption.

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New Zealand Department of Agriculture

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Field Day at Washpool Station

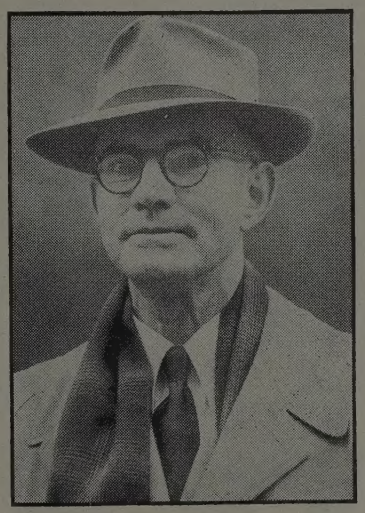
Grassland Conference in Hawkes Bay

By G. J. NEALE

AN unusually wet winter in Hawkes Bay and a "growthy" spring combined to provide for the 17th Conference of the New Zealand Grassland Association in Napier in early October plenty of subject matter for study and discussion. No introduction to a film epic could have so effectively reiterated the theme of the conference than did the seas of grass that rolled to the horizons throughout the province. The abundant feed and the heavy concentrations of stock may have provided satisfaction for those who claimed some responsibility for the quality and quantity of the pastures and the health of the livestock; but shortcomings were apparently evident to scientists, who are reputedly never satisfied; and local farmers at the conference remembered domestic problems and difficulties of seasons when the rainfall was not so persistent and the all-pervading colour was brown instead of green.

REFERENCE to Hawkes Bay as a Cinderella province, in that it had not the research station that its eminence as a pastoral district appeared to warrant, was made by Mr. F. H. R. Gilbertson in welcoming delegates on behalf of the Hawkes Bay Provincial Federated Farmers. That the Cinderella must have been in princess guise for the conference was the counter of Dr. G. A. Currie, Vice-Chancellor of the University of New Zealand, who delivered the opening address. There could be "no lovelier sight", he said, than the district presented as he travelled to Napier.

The conference was the first held by the Association in Hawkes Bay and was well supported by farmers, farming organisations, and commercial interests connected with the industry. Students from Napier Boys' High School and Te Aute College attended all sessions. The field day had to be postponed because of the rain which persisted almost throughout the conference, but though it was held in overcast conditions it was attended by a very large crowd.



[Photo News

Dr. G. A. Currie: "Only through the co-operation of all men can the treasures produced by science be made available to all people."

Science and Primary Production

The development of science through the centuries and how the sciences related to primary industries could advance only as science generally advanced were discussed by Dr. Currie in his opening address. He described the present challenge to food producers of the world and to scientists by the needs of the rapidly increasing population and gave instances of science's contribution to present-day primary production.

"Our early Victorian ancestors," he said, "were convinced that the rapidly increasing power over nature brought by science and applied to man's material needs would bring on the millennium. Utopia, for those early Victorians, was just round the corner; a world of plenty was possible, they felt, and they could see no reason to believe that men would fail to develop it and build a new earth, if not a new heaven. The disquieting theories of Malthus coming toward the beginning of the 19th century could hardly make a mark on the supreme confidence of the Victorians. Malthus's theory is alarmingly simple: the population of any animal must be controlled in the long run by the amount of food available to it. Man, like other creatures, has to eat to live and can keep on increasing in numbers only so long as sufficient food is available to him; so that, according to Malthus, population must eventually overtake the food supply. I doubt if there ever will be any complete denial of this as a pure theory.

"However, the world has still to develop a long way before it reaches its maximum production of food and, consequently, its maximum possible population. Science has entered more and more into production and thereby increased it, and at the moment we cannot see the end of this productivity. It is possible that the Malthusian nemesis may never overtake mankind, since the number of people dependent on the food supply may be voluntarily adjusted to the food available instead of allowing starvation to reduce the numbers. Today we are still able to produce food for all comers, although we may not be able to distribute it so that all men may eat well; indeed, we believe that the daily diet of more than a quarter of the world's people is insufficient for optimum growth and energy.

"Our world population today is about 2,400,000,000 and the population, according to FAO, is increasing at the rate of about 80,000 a day or 30,000,000 a year. It is not the Far East that is increasing at the fastest rate, but places like Australia, New Zealand, and Latin America, and in all countries the improvement in health is saving the very young and lengthening man's life, thus adding to the world's population.

"Whatever the ups and downs of prices for primary products may be, the long-term story is plain. The world population is increasing by about 1.4 per cent. annually and the food supply must increase at least in the same proportion in order that all men may live. At present a large proportion of the world's population is under-nourished, so that we may take it that an increase of something approaching 1.5 per cent. per annum in the food supply is necessary if all men are to eat well and if all newcomers are to find enough to live on.

"While new land for development becomes scarcer all the time, the scientist becomes constantly more important, since on him in great part will rest the responsibility for finding means to greater and greater productivity on developed as well as on undeveloped areas. The scientist, however, is only one element in the productive plan, for the application of science depends on a well-educated, highly developed community, and since all things hang together in this world, it is not possible for the scientist himself to increase production

← 1—Some of the flats of Washpool Station, part of the 30,000-acre Maraekakaho Station bought by Donald McLean about 1856 for about £1000. 2—I. J. Pohlen (back to camera) discusses soil types of the district. 3—Field day visitors arrive at the Washpool woolshed. 4—Part of the field day attendance during the tour of Washpool. 5—Mr. G. M. Glazebrook discussing Washpool Station, "a monument to the industry and foresight" of his late father. At right, Dr. J. F. Filmer, whose presidential address gave important emphasis to the animal : pasture synthesis. 6—Inspection of trials with chemical control of barley grass, described by F. H. Collin, shown explaining the trials in (8), as "the No. 1 problem weed in Hawkes Bay". In the dry summers of the district it is difficult to keep a pasture cover on the soil, and as soon as the sward opens up barley grass comes in. 7—At the demonstration of pasture renovation with pitchpole harrows.

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← 1—S. H. Saxby, who relinquished the secretaryship of the New Zealand Grassland Association 2 years ago because of his duties as organising secretary of the 7th International Grassland Congress in New Zealand in 1956, was elected at Napier vice-president of the New Zealand Association. 2—Professor J. W. Calder, the Association's new president, who will preside at the New Zealand Association's conference in 1956 at Lincoln College after the International Congress at Massey College. 3—Dr. J. Melville, whose appointment to the directorship of the Waite Agricultural Research Institute, South Australia, prevented his assumption of the presidency of the New Zealand Association. 4—C. J. Hamblyn: Application of mob stocking methods requires of hill country farmers initiative and ability in stock and pasture management shown by dairy farmers. 5—Dr. P. D. Sears, Dr. L. R. Wallace, and I. L. Elliott discuss a sward at Washpool. 6—L. W. Blackmore: It would be a pity if, in the enthusiasm for overdrilling, the important facts of pasture establishment were forgotten. 7—R. H. Scott: A bird's eye view of Hawkes Bay's farming development and intelligent guesses about its future. 8—"Without benefit of grassland science". "Native parsley" (storksbill), being examined by Dr. J. S. Gibbs (right), was commended by Mr. Glazebrook as coming away quicker than anything else after autumn rains. 9—E. D. Andrews: Application of existing knowledge of cobalt deficiency problems has resulted in economic gains that can be measured in millions of pounds.

without the whole community advancing at the same time in its standard of living and education in order that the findings of science may be put to full use. In this situation New Zealand's destiny, in so far as we are a primary producing country, for some years to come must clearly be in the direction of greater and greater production from the land, whatever we may be able to do towards further industrialisation."

Some of the more spectacular contributions which science makes to primary production were described by Dr. Currie, who said that the application of science to primary industry and the opening of new lands to cultivation had assured that food supplies had kept pace with the increase in population since Malthus's gloomy predictions at the end of the 18th century.

"The continual co-operation of the scientist and the primary producer has been necessary to produce the tremendous yields which are a feature of advanced farming today, and which could never occur under natural conditions," he said. "The problems of the soil, of the plant, and of the animal are the subject of investigation by the scientist and the solution of the problems, when placed in the hands of the farmers, gives most favourable results. Neither can be effective without the other. . . .

"It may be that the part the scientist now plays in primary production has been over-stressed. . . . Advanced civilisation must depend on a division of labour between those who produce goods and those who produce services. Although the basic necessities of life are food, clothing, and shelter, civilised men depend for the colour, the quality, and variety of life on the musician, the churchman, the teacher, the scholar, and the entertainer. It is true that the wealth of our material world does depend in a very special way on the scientist's contribution to our civilisation, but only through the co-operation of all men can the treasures produced by science be made available to all people. The whole community needs to be brought up to a high level of thought and effort before the knowledge produced by science can be applied to the means of better living.

"The limit of productivity has not been reached by any means. Even in our own country the average butter production in good dairying areas may be only 180lb. per acre where 400lb., or even higher amounts, according to our scientists, are possible. However, it is to be remembered that farmers, like other men, vary widely not only in their knowledge of the means to efficient production, but also in their will and energy to obtain efficient production. The limit of production is not set by our scientific knowledge, but by the extent to which human fallibility, indolence, and prejudice enter into the make-up of men everywhere. Even when knowledge and human failings have determined the limits of possible productivity, there are still the vicissitudes of the weather and seasons to contend with.

"It is certainly necessary in this rapidly expanding world, if we are to feed our people well, that the community should work together with the scientist so that the material Utopia to which our grandfathers looked forward so confidently may eventually come to pass," Dr. Currie concluded.

Papers and Speakers

"Science Applied to Primary Production"—Dr. G. A. Currie, Vice-Chancellor of the University of New Zealand.

"Farming in Hawkes Bay"—R. H. Scott, Department of Agriculture, Wellington.

"Grazing Management on Hill Country"—C. J. Hamblyn, Department of Agriculture, Palmerston North.

"Manuka Blight in Northern Hawkes Bay"—E. C. Ayson, Wairoa, and D. I. Glue, Wellington, both of Department of Agriculture.

"Local Weed Problems"—L. J. Matthews, Department of Agriculture, Wellington.

Presidential Address, "The Pasture : Grazing Animal Complex"—Dr. J. F. Filmer.

"Bloat Investigations"—C. S. W. Reid, Department of Scientific and Industrial Research, Palmerston North.

"Rickets in Lambs"—Dr. A. B. Grant, Department of Agriculture, Wallaceville.

"Cobalt Deficiency"—E. D. Andrews, Department of Agriculture, Wallaceville.

"Ruakura Studies on the Grazing Behaviour of Dairy Cattle"—P. J. Brumby, Department of Agriculture, Ruakura.

"Strip versus Paddock (Rotational) Grazing of Dairy Cows"—Dr. C. P. McMeekan, Department of Agriculture, Ruakura.

"Management and Utilisation of Pasture by Pigs"—D. M. Smith, Department of Agriculture, Ruakura.

"Nutrition Problems on Pastures on Ahuriri Lagoon Reclamation Area"—F. H. Col"., and J. J. Byrne, both of Department of Agriculture, Hastings.

"Pasture Establishment on Virgin Pumice Country"—Dr. P. D. Sears and R. M. Greenwood, both of Department of Scientific and Industrial Research, Palmerston North.

"Overdrilling of Pastures"—L. W. Blackmore, Department of Agriculture, Dannevirke.

"Survey of Trace Element Field Trials in New Zealand"—C. During, Department of Agriculture, Wellington.

"Trace Element Trials at Invermay"—N. A. Cullen, Department of Agriculture, Invermay.

"Proceedings" of the Conference, containing papers and discussions, will be sent to full members. Additional copies (15s. each.) may be ordered from the Secretary of the Association, Box 1500, Wellington.

The Pasture : Grazing Animal Complex

Prefacing his presidential address with the remark that the association must be presumed to have known what it was doing when it elected as its president one whose "only knowledge of grass is that animals sometimes eat it", Dr. J. F. Filmer, Director of the Animal Research Division of the Department of Agriculture, delivered a paper

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that was an excellent background to the deliberations of the conference and the title of which, "The Pasture: Grazing Animal Complex", formed the subject of an all-day symposium of papers and discussion.

Pastures

None of the indigenous plants comprising the pastures grazed by the first introduced sheep and cattle was capable of very high production, said Dr. Filmer, and gradually they were replaced by introduced species, two of the early introductions being ryegrass and white clover.

"The history of grassland research in New Zealand is largely a story of selecting more productive strains of ryegrass and white clover and determining the best methods of establishing and maintaining pastures dominated by these two species. . . .

"Today, the first stage of pioneering is almost over and we could well re-examine our grassland philosophy to see if it needs revision or at least elaboration. Because of the success of perennial ryegrass and white clover there has been a tendency to exclude consideration of other species. True, some attention has been paid to red clover, cocksfoot, subterranean clover, and recently to short-rotation ryegrass, which has tended to displace perennial ryegrass from its premier position. But the New Zealand agrostologists have never swerved from their allegiance to ryegrass and white clover, and they sometimes give the impression of consecrated crusaders who would rather fail with these two species than succeed with any others. . . ."

In considering the shortcomings of pasture in New Zealand today, Dr. Filmer said that on many dairy and fat lamb farms the ryegrass and white clover species were in general satisfactory with the following important exceptions. Ryegrass caused facial eczema in some autumns; white clover caused bloat; milk fever and grass staggers were serious problems on dairy farms in some springs, and unthriftiness in hoggets caused severe losses in some autumns.

"We cannot afford to be complacent about these problems and their solution will require the concerted efforts of pathologists, chemists, plant breeders, and animal husbandry men," he said.

In emphasising the need for more realism in acknowledging the limitations of perennial ryegrass, short-rotation ryegrass, and white clover, Dr. Filmer said the New Zealand agrostologists' philosophy had been that if conditions were not good enough for ryegrass and white clover, it was better to improve the conditions than to breed species to suit them. "This is rather like putting pants and petticoats on naked savages to make them more receptive to christianity. It must surely be obvious that some of our New Zealand grazing areas are not well adapted to, and cannot with our present resources be adapted to, the requirements of ryegrass and white clover. . . . I hope that in the near future our agrostologists will accept the challenge of our more difficult grazing areas. There are some species which are better adapted to these than ryegrass and white clover. Why should the spectacular improvement made in the latter species not be repeated if equal attention were paid to Yorkshire fog, browntop, danthonia, paspalum, subterranean clover, *Lotus*, and lucerne? There may well be other species worthy of attention."

The Grazing Animals

Some improvements should be made, said Dr. Filmer, both in the intensive productivity of stock and in the management of pastures.

"Our Romney and half-bred ewes are remarkably adaptable, produce commendable quantities of saleable wool, and when crossed to down type rams produce excellent lightweight lambs. They have, however, one bad fault. Their lambing percentage, even under the most favourable conditions, is relatively low. Not many fat lamb farmers in New Zealand market more than 100 per cent. of lambs. English farmers, using different breeds, frequently market 150 per cent. of lambs. A marked increase in lambing percentage would provide the most profitable method of utilising our spring and summer flush of grass.

"The average per cow production on many of our dairy farms is lamentably low. Though environment is the most important cause of this, the great variation in production between cows within herds shows that the influence of heredity is by no means negligible. Recently the accent has been on progeny-tested bulls, and if artificial breeding develops, this may assume increased importance; but improvement by this means can only be slow. A much more rapid increase in average per cow production could take place if dairy farmers were to cull more ruthlessly for low production. . . . The average per cow production of tested herds in New Zealand is only about 201b. of butterfat above the national average and most of this is due to difference in test.

"Nothing could be more wasteful than our method of slaughtering one million bobby calves annually. If these could be sired by a beef bull and well fed to 2½ years of age, they could produce annually over 200,000 tons of light, lean beef which is much in demand.

"The essential feature of pasture management in New Zealand is the fitting of animal requirements and pasture growth to each other. An improvement in this adjustment is capable of at least doubling the average production of our fat lamb and dairy farms. Improvement should come along two main avenues: Increase in available pasture during early spring and late summer and more efficient utilisation of the late spring and early summer flush. Autumn saving of pasture can produce a tremendous increase in the amount of feed available in early spring, and it is feed of high quality. To achieve the maximum results, cows must be fed silage while growth is still good in the autumn and ewes must be restricted to small areas as soon as tupping is completed.

"On fat lamb farms early weaning and spelling or light grazing of pasture during late December and early January will encourage the growth of white and red clovers, which are excellent feeds for fattening lambs during autumn.

"Efficient utilisation of the spring and summer flush depends on the efficient conservation of all available surplus feed and on adequate stocking. The latter is dependent on the former, and both are dependent on the provision of extra feed in early spring and late summer. In New Zealand we badly need to improve our methods of making hay and silage. Our present methods are not only wasteful, but they result in very indifferent products.

"These improvements in pasture management would result in an increased annual yield of pasture with an attendant increase in rate of stocking and would also greatly improve the nutrition of cattle and sheep during critical periods. They would permit better winter feeding of cows with its marked effect on the subsequent lactation; better winter feeding of ewes with the elimination of sleepy sickness and an increase in wool production; better feeding of cows following calving, when they nearly always have to draw on their body reserves; better feeding of lambs and the flushing of ewes in the autumn; and last, but by no means least, an insurance against periodical summer droughts."

Man

Although agricultural research in New Zealand had achieved some notable successes, Dr. Filmer said he believed its brightest days were still ahead. Only now was a New Zealand agricultural research outlook beginning to develop. "Men are now coming forward who are not content blindly to follow the shibboleths of pundits reared in different systems of agriculture. New Zealand agricultural scientists are becoming conscious of the unique problems that present themselves in our paddocks. They are developing techniques with which to measure the behaviour of plants and animals in the paddocks. Such an approach must yield valuable results. . . .

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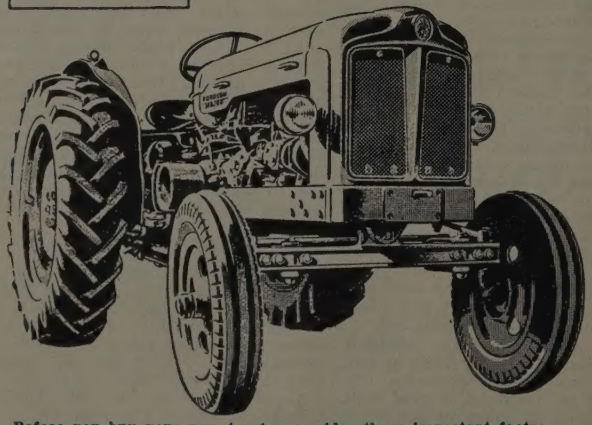

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"If the research worker should have a paddock outlook, the extension worker must have a farm outlook. Pasture establishment, pasture management, animal production, and animal health under New Zealand conditions are so interrelated that they must be considered together. We need farm advisers who can integrate the advice of specialists in such a way as to increase the long-term efficiency of the farm."

The fact that the majority of New Zealand farm produce was sold on the other side of the world in a very discriminating market had forced the New Zealand farmer to think of farming as a business, said Dr. Filmer. "He must produce economically if he is to meet world competition in distant markets and enjoy a reasonable standard of living at home. He cannot afford to employ labour on the scale one sees on British farms. He probably cannot afford to devote so much attention to the niceties of cultivation which are a feature of British agriculture. Neither can he afford to neglect the quality of his products. Perhaps he needs to develop a little more of the British farmer's pride in his stock, his crops, and his pasture.

"The accent in New Zealand is rightly on efficiency of production and we tend to scorn the standards of the show ring. There may be no correlation between type and production, but stud breeders set great store on the perfection of their animals as judged by breed standards. Have we given them anything to replace this?" The farmer, Dr. Filmer believed, could not be inspired to do his best by encouraging him to adopt a ruthless deification of efficiency at any cost, and he pleaded for standards which would meet the consumers' demands and which the farmer could take pride in achieving.

"We cannot afford to sacrifice efficiency to sentiment; neither do I think we can make farming attractive to the best of our people by endeavouring to base financial prosperity merely on progeny tests, production statistics, soil analyses, farm budgets, overgrazed pastures, and under-fed stock.

"Farming is an art as well as a science and it should give aesthetic pleasure as well as mental stimulus and financial profit. I am convinced that New Zealand farmers need not sacrifice their prosperity by making New Zealand a green and pleasant land stocked with healthy, well-nourished animals in which they can take great pride and whose produce will bring true satisfaction to those who receive it," Dr. Filmer concluded.

Field Day at Washpool Station

The four different types of country comprising the 3600 acres of Washpool Station, property of the late Mr. H. M. Glazebrook and part of the original Maraekakaho estate, which was visited by the conference, provided a variety of examples of the problems and management techniques on a large grazing property in Hawkes Bay.

Mr. G. M. Glazebrook, who with his brother now farms his late father's property, described the station. A large area of alluvial silt and shingle was well drained and did hoggets very well. It was largely cropped for oats at the turn of the century. Flats on the west got very wet in winter; on a hard pan, they dried out and got very hard in summer. Hills at the back of the station were very well drained and had a lot of limestone. Summer country comprised drained swamp that flooded very badly in winter.

From an original 5 paddocks that wintered 5 thousand wethers, the property had been subdivided and by 1937 comprised 60 paddocks that wintered 3.8 to 4 ewes per acre. The policy had been to buy in 5-year-old ewes, because 2-tooths got too fat, but in 1947 a change was made to dry sheep, principally because of the difficulty of getting labour at lambing time. The station was now running all dry sheep, the principal buying time being when store sheep came off the colder country.

Autumn grass staggers was the principal menace to stock and the aim in stock management was to clean up the grass before the autumn growth. If there was a growthy period in late autumn, facial eczema was likely to occur.

Topdressing was indiscriminately started in 1937. Superphosphate at 1cwt. per acre was applied 2 years out of 3. Some liming was done, but there did not seem to be any visible response. A ton per acre once every 5 years kept the pH at a reasonable level. Ammonium nitrate-lime had been used in paddocks shut for grass seed.

Any cropping done was in connection with regrassing rather than for the provision of winter feed.

Pasture Management

Pasture management aimed at cleaning up the country, particularly the hills and light flats, for the autumn rains. Some hay was cut and some paddocks shut for grass seed. Often 40 acres of peas was put in as a cash crop in turning heavy country back to grass. There was no fixed programme, because rainfall varied so much. The average annual rainfall of 28in. to 30in. came in "dollops" or not at all.

On the front flat paddocks pastures comprised mainly ryegrass, subterranean clover, and "native parsley" [storksbill (*Erodium*)]. As soon as autumn rains came the "parsley" came away quicker than anything else.

On the heavy swamp country the clovers were mainly white, subterranean, and strawberry.

The hills, much of which had never been ploughed in Mr. Glazebrook's memory, were principally in subterranean clover, danthonia, and ryegrass. Danthonia, said Mr. Glazebrook, was a very useful grass. In dry summers pastures without danthonia were inclined to open up. With danthonia recovery was very rapid and danthonia pastures could be used as "medicine" paddocks.

Weed Control on the Hills

Thistles had been sprayed in the last two seasons quite successfully. The earlier in the spring or the later in the autumn thistles could be sprayed the better control would be achieved, as cover required was then at a minimum. DDT superphosphate was used for grass-grub control.

Barley grass thoroughly infested the hills and its control was a big problem.

Sheep

The number of hoggets bought each year varied a lot. The number wintered and shorn varied from 6 to 9.5 per acre, which showed how winter carrying capacity was affected according to the season experienced.

The policy was to buy in the autumn and "if everything is all right" buy some more. A certain number were sold in the wool to butchers and the rest to the works from October on. A number of 2-tooth wethers were bought in spring to replace the fat wethers.

Hogget losses averaged about 3 per cent. Hoggets were kept off the heavy country and there was not a great deal of ill thrift. After a thoroughly dry and difficult autumn hoggets were dosed, but in a reasonable autumn with a reasonable amount of feed, Mr. Glazebrook said he did not bother to dose, as he never saw any results from it.

Cattle

From September on, 2- or 3-year-old steers were bought in the hope that they could be got away fat from March on. Running cattle and sheep through the winter did not work well.

Pasture Renovation

Any crops grown on the property were as part of the regrassing programme, said Mr. Glazebrook, but if pastures could be renovated, it was a lot cheaper than cropping. The light country could be worked up very easily with the discs and oversown with a hoe-type drill. That system had increased carrying capacity a lot. On country that got very hard and dry in summer a disc-type drill was used.

Oversowing was done in time to catch the first autumn rains. It was common to get ¼in. of rain and then none for 6 weeks, but Mr. Glazebrook

said he was going to keep at it. He was going to carry on with danthonia on the hills, as he did not want to plough them.

He tried to do all oversowing in January and February when the ground was usually hard and dry. He had got pitchpole harrows, which were very hard to pull, but an implement was wanted that would rip the ground up for 3in. Advantages of the pitchpole were that with the very high temperatures and little autumn rain, conditions of sufficient moisture for germination were procured. Seeds mixtures for oversowing were usually 5lb. of cocksfoot, 2lb. of white clover, and 1lb. of strawberry clover for heavy summer country, 5lb. of short-rotation ryegrass for light flats, and 3lb. of subterranean clover and 2lb. of white clover for hills.

Congratulations to Mr. Glazebrook on his demonstration of the importance on such a large unit with an extreme climatic range of maintaining a nice balance between the dry hill country and the flatter, wetter country were conveyed on visitors' behalf by Dr. P. D. Sears. Dr. Filmer referred to Mr. Glazebrook's making everything seem delightfully simple, but he felt sure that the buying of 10,000 lambs, letting them loose on Mr. Glazebrook's types of country, and carrying them through with only about 3 per cent. of losses reflected a lifetime of very keen observation of the requirements in stock and grassland management.

Election of Officers

Officers elected at the Association's annual meeting were: President, Professor J. W. Calder, Canterbury Agricultural College, Lincoln; vice-president, S. H. Saxby, Department of Agriculture, Wellington; secretary, D. I. Glue, Department of Agriculture, Wellington; committee members, C. E. Iversen, Canterbury Agricultural College, and L. Corkill, Department of Scientific and Industrial Research, Palmerston North. Dr. Filmer, the immediate past president, is a member of the committee. Dr. J. Melville, last year's vice-president, would have succeeded to the presidency this year, but was prevented from taking office by his acceptance of the directorship of the Waite Agricultural Research Institute, South Australia. The Association congratulated him on his appointment and tributes were paid to his work for the Association and for grassland research.

The conference in 1956 is to be held at Canterbury Agricultural College, Lincoln, after the 7th International Grassland Congress at Massey Agricultural College, Palmerston North. Hamilton, Tauranga, and Palmerston North were recommended for the consideration of the incoming executive as locations for the conference in 1957.

Photographs, except that on page 539, by R. W. Orr.

Hill Pasture Renewal

In the Gisborne-East Coast area there are thousands of acres of easy hill country under degenerated pasture which could and should be resown. The turf should be broken in January or February with a double cut of the giant discs followed by sufficient tandem discing to break the clods into a fine tilth. This should be followed in March by another tandem discing if turf and weeds are showing strong growth. If little or no growth has occurred, the area should be harrowed to kill seedlings and consolidated by tramping with large mobs of sheep or cattle. These must be driven over and over the area until it is quite firm.

As soon as the ground is firm, thousand-headed kale should be sown at the rate of 2lb. per acre if drilled or 3lb. if broadcast. However, kale will not germinate satisfactorily on these hill soils unless the ground is well consolidated. It is a waste of time and money to sow in loose soil. Provided the tramping before sowing has been thoroughly done, the seed can be covered by use of a brush harrow. Tine harrows or heavy chains should not be used on light soils. It is generally safer to put sheep over the paddock again after sowing and brush harrowing. Cattle should not be used at this stage, because if showers have made the soil soft, the seed will be buried too deeply.

Manure at the rate of 2cwt. of serpentine superphosphate should be applied at the time of sowing. It should not be mixed with the seed. If it is necessary to mix manure with the seed, use reverted superphosphate, and even then the seed must be mixed and sown straight away.

Barley the Second Crop

When the kale has been eaten off the paddock should be tandem disced about September and broadcast with 3 bushels of Cape barley and 1cwt. of superphosphate per acre, the seed being lightly harrowed in. The resulting greenfeed crop of barley should not be set-stocked but should be grazed off at suitable intervals by sizable mobs of sheep until January. The stubbles should be tandem disced again and then left fallow until March or April, according to the season, when they should be harrowed to kill weeds and once again tramped with sheep before sowing.

Seed Mixture

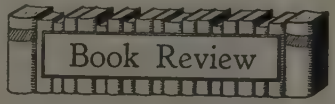
All discable country in the area will grow good ryegrass and red and white clovers provided at least 3cwt. of superphosphate is sown at seeding time and the sward is regularly topdressed in the following years. In case of early frosts Italian ryegrass should be used in the mixture on the lighter ash soils and short-rotation ryegrass on the heavier ones. A recommended seed mixture is 15lb. of Certified Italian ryegrass or short-rotation ryegrass, 15lb. of Certified perennial ryegrass, 2lb. of Certified white clover, and 4lb. of Certified Montgomery red clover per acre.

After Care

The resultant first-class pasture should not be ruined by set-stocking. The pasture should be grazed with large concentrations of stock and at least 1in. of growth should be left on the plants.

This management plus annual topdressing will ensure that the pasture is kept in first-class condition for several years, and if the extra feed is used efficiently, the increased production in stock will pay a large dividend on outlay.

—H. de O. CHAMBERLAIN,
Instructor in Agriculture,
Department of Agriculture,
Gisborne



"Soils and Manures in New Zealand": L. J. Wild

"SOILS and Manures in New Zealand" has long fulfilled a definite need in the Dominion's agricultural literature as a source of general information on soil fertility for farmers and students. The fifth edition, which has now appeared, brings the text generally in line with recent advances in soil science. It includes a very useful introduction to the classification of New Zealand soils and draws attention to the growing importance of minor elements in soil improvement practices. This revised edition provides a useful guide to general readers who seek an initial understanding of New Zealand's soil fertility and soil management problems.

—P.W.S.

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Honey-extracting Room with High Standards of Efficiency and Cleanliness

By L. H. JOHNSON,
Apiary Instructor, Department of Agriculture, Palmerston North

IN nearly every honey house of recent construction it will be found that some new ideas have been incorporated which are not found in older buildings. For each special feature there may be a case for and against. The extracting room illustrated in this article is part of a honey house recently built by Mr. E. J. Whalley, of Kakatahi, Wanganui. All of the equipment is new and works very efficiently.

THE inside measurements of the room are 12ft. by 16ft. with an 8ft. 6in. stud.

Building Construction as Seen inside

Special attention has been given to the floor. First the flooring was laid down side up and left loose for a few days, during which time a good deal of shrinkage took place. All of the flooring was then heavily coated with raw linseed oil, after which it was reversed and cramped together. All nails were punched and stopped with putty. Any open joints or blemishes were filled with plastic wood. The by-wood was then cleaned off with a sanding machine and the floor was coated with raw linseed oil.

The purpose for making the floor so even was to ensure smooth running for any wheeled floor conveyance that might be used and the liberal application of oil to the timber was for three reasons: To hold the timber from shrinking; to render the floor impervious to water or honey; and to give a finished and pleasing appearance.

Wall Sheathing and Ceiling

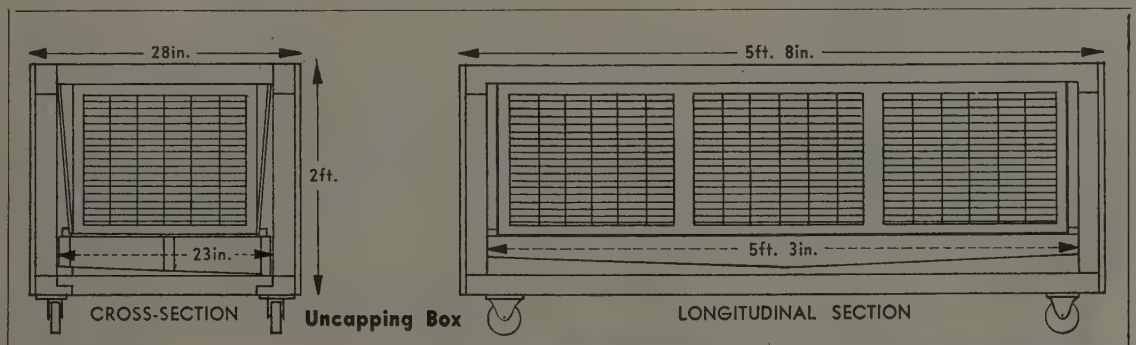
Asbestos cement sheets to a height of 4ft. form the lower wall sheathing. Because the sheathing is breakable, it should be protected by fixing 3in. x 1in. battens horizontally at 1in. centres to the studs. The studs above this and the ceiling joists are covered with wood pulp soft board.

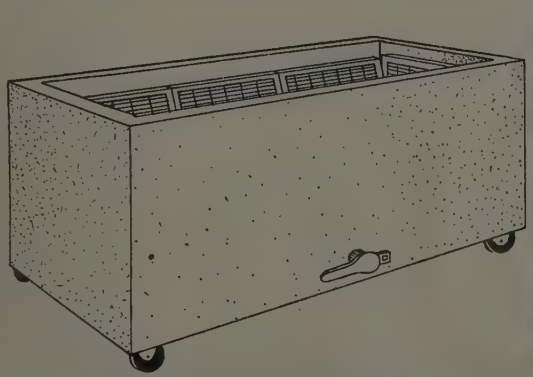
Windows

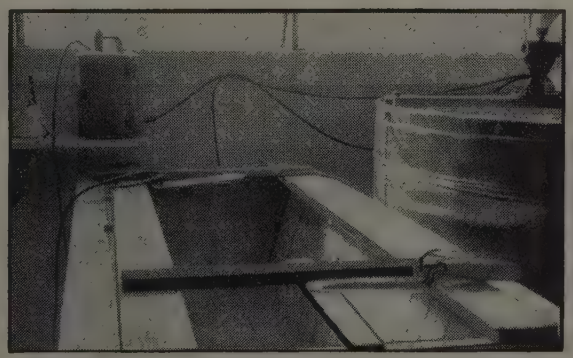
A pair of windows each 3ft. 10in. high by 2ft. 6in. wide of the glass louvre type that can be opened or closed are found to be satisfactory, as they are easy to operate, good for ventilation, and bunches of bees may be easily ejected. Cost of installation is below that of other windows.

The sill height from the floor is 3ft. 9in. On the partition wall between the extracting and packing rooms there is a three-light window with two fixed panes of clear glass and one pane in halves made to slide open or shut. Not only does this admit light from another angle, but the rising level of honey in a tank may be seen from the extracting room.

The door, in keeping with the quality of the rest of the interior







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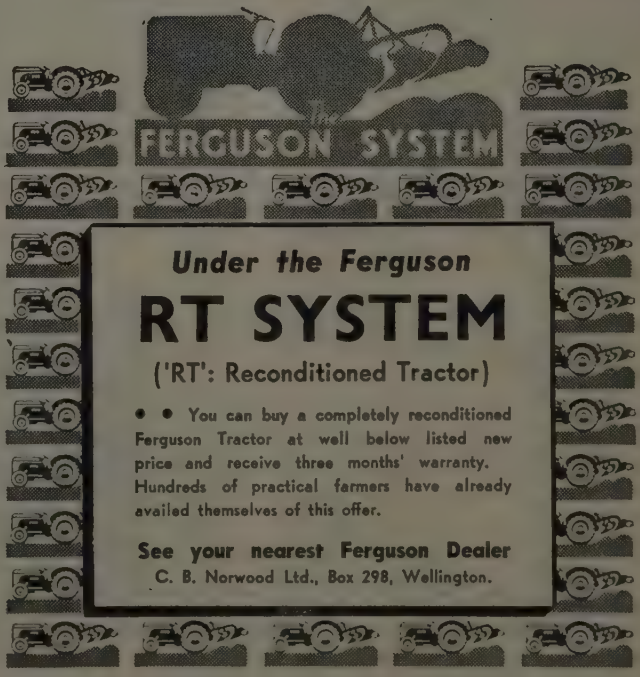

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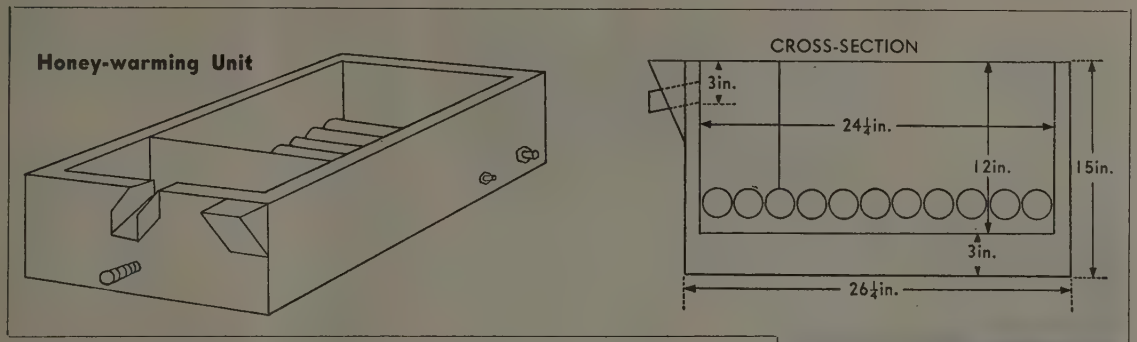


finishings, is a flush type fitted with a chromium-plated catch.

All joints in the wall sheathing and ceiling have been covered with half-round mouldings and quarter-round strips have been fixed to all internal angles.

The windows and doors have 3in. x 1in. bevelled architraves fixed to the margins. Six-inch bevelled edge skirting boards have been used.

Good Finish

The walls and ceiling have been given three coats of glossy finish weather-resisting paint of an ivory tint, but the skirting and door have been coated with raw linseed oil and then varnished. All surfaces are washable. With this finish the room would make first-class office accommodation.

Means of Heating the Room

An electric heating element of the tubular type to operate at a moderate temperature is part of the equipment. A thermostat regulates the heat to any temperature that may be desired, usually between 80 and 90 degrees F. A load of honey in the comb brought in during the day and left overnight in this temperature will be in good condition to extract next day.

A wash-hand basin has yet to be fitted to the wall near the uncapping box.

Extracting Plant

To handle honey from the combs to the tank four pieces of equipment are used: Uncapping box, extractor, honey warming unit, and honey pump.

Uncapping Box

There is nothing new in the general principle of an uncapping box for draining honey from cappings, but the important point is that all of the honey so obtained is of first-class quality. To get the maximum drainage of honey from the cappings it is necessary:—

1. To keep the liquid honey thin by some method that will ensure a constant warm temperature.

2. To break the cappings up thoroughly and to turn them periodically.

The uncapping box is a home-made appliance which can be easily understood from the diagrams.

A supporting framework of 3in. x 2in. timber is sheathed on the outside with wood pulp soft board and on the inside with tinned steel so as to form a tank.

To facilitate complete run-off the bottom of the tank or box has a two-way fall to the outlet mid-way on the side.

Queen excluders placed along the sides, ends, and bottom make a suitable strainer. The strainer rests on a 3in. x 1in. timber frame with a runner down the centre and is shaped to fit the bottom of the uncapping box. They may all be lifted out to be washed. To provide warmth two electric light bulbs are fixed under the strainer and are shielded from drips of honey.

On the top a timber frame is fitted with a cross-piece to set frames of honey on for uncapping and also a rack for holding uncapped combs. This frame may be lifted off and a lid covered with wood pulp soft board may be placed on top to retain the warmth. All of the soft board has been given three coats of paint so that it is waterproof and washable.

Supers with combs of honey are brought by a honey house wagon into the extracting room. To avoid unnecessary stooping, supers of honey with drip trays underneath are set on empty hive bodies placed on the floor.

Combs of honey are uncapped over the uncapping box and all honey that drains from the cappings will flow through a chute which passes under the extractor to the warming unit.

The appliance is mounted on four industrial plate castors so that it may be moved out from the wall to facilitate cleaning when necessary. When no more honey will drain from the cappings they are then forked out and put through a Baines melter. Honey that is recovered from the melter may be sold to a manufacturer or fed back to the bees. The treatment of cappings can be done without holding up the routine work of extracting.

Honey-warming unit, auxiliary tank, and honey pump. The tubes of the warming unit are covered with honey.

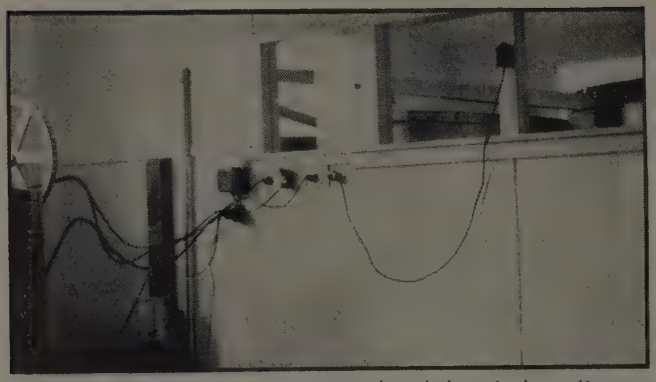
Extractor

The extractor is the latest 21-frame semi-radial machine and appears to be very satisfactory. It is powered by an electric motor which is bolted to a shelf on the wall. The chute is arranged to take the flow of honey from the extractor outlet.

Construction of Honey Warmer

The honey warmer is of a design that has been in use for some years and overcomes a bottleneck in the warming and straining process. The warmer now used stems from the original adaptation of a Baines melter for this purpose by Mr. E. J. Kirk, of Wanganui. Of all the honey warmers

HONEY-EXTRACTING ROOM



Vertical delivery pipe from pump. Honey tanks and chutes in the packing room can be seen through the windows in the partition.

made this appears to be one of the best yet devised.

The appliance has a small oblong tank with an inner and outer wall. On the inside between the two side walls and 1in. up from the bottom a number of 2in. tubes are fixed in position with 3/16in. spaces between them.

The space between the walls, the double bottom, and in the tubes holds water for warming which is heated by a 2000-watt electric element and the temperature of which is controlled by a thermostat. Honey flowing from the chute will fill the heater and keep it at the level of the outlet. All honey flowing in must pass between a series of hot tubes near the bottom and rise up past the baffle to the outlet.

The warmer is also a gravity strainer. Particles of wax and other bee comb debris do not readily pass between the warm tubes, but rise quickly to the surface and as the floating mass accumulates it becomes a strainer.

From the outlet honey flows into a small tank 25in. x 12in. x 12in. The floor has been recessed to a depth of 12in. to take the warmer and tank.

Honey Pump and Strainer

Bolted to a piece of timber on the wall is a modern gear-type honey pump. Connected to it are 1¼in. diameter nickel-finished brass pipes and all the joints are held together by nickel-brass unions. They are tight fitting, but may be easily dismantled. As the pump has to pull the honey up from the bottom of the tank, it has to be primed with honey before being started. A float operates a mercury switch to control the motor and pump.

The honey is pumped through the minimum of piping and bends to the required height so that from the delivery end through the wall in the adjoining room it gravitates through an open chute to the honey tanks. A large bulk of honey will retain its warmth for several hours during which time pollen grains and froth will rise to the surface from where they may be skimmed off.

Instead of using gravity for clearing honey a fine strainer may be used. Warm honey is comparatively easy to strain through either cheesecloth, fine brass mesh, or Swiss bolting silk. This last may be obtained from a firm or decorator who specialises in silk screen process printing. No. 6XX is a suitable size of mesh. The silk is expensive, but is very strong and makes an excellent fine strainer which should last for years.

The honey-warming equipment may also be adapted for liquefying granulated honey in bulk containers. Extra heat required in the uncapping box may be obtained by fixing to the inside walls a "Pyrotenax" cable of 800 watts and plugging it into the power supply. The temperature should be under thermostatic control.

Twelve 60lb. tins of granulated honey may be placed upside down with the lids removed in the uncapping box. After the lid has been closed and the heat switched on the honey that liquefies will run from the tins and gravitate through the chute to the heater. To liquefy all crystals completely the heater may be run at 160 degrees F., which should raise the temperature of the honey to 140 degrees F. From here the honey that flows into the small tank is pumped through to the holding tanks, the whole process being automatic.

This all-electric power, heating, and lighting set-up will put honey through the total process for less than £1 per ton.

Daily Clean up

If during the extracting period any drops of honey appear on the floor, they are promptly cleaned up and never left overnight. The outsides of the uncapping box and extractor are also cleaned daily.

Bees brought in on the combs will soil the windows, walls, and ceiling and these have to be cleaned continually. A long-handled mop is useful for this job. A vacuum cleaner is effective for periodically collecting bees from off the floor and windows.

The inside finish of this extracting room and the standard of cleanliness measure up to the standard which Apiary Instructors have been advocating.

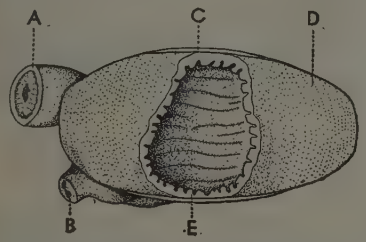
Meteorological Records for October

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in Inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	59.2	+ 2.4	73.6	40.0	9.04	21	+ 4.53	1.68	1	142.2
Auckland	160	59.1	+ 1.7	69.5	47.1	5.57	17	+ 1.48	1.38	13	163.4
Tauranga	10	57.6	+ 1.6	69.3	39.0	6.50	18	+ 1.53	1.39	4	178.6
Ruakura	131	56.6	+ 2.3	73.4	35.3	5.02	17	+ 0.89	1.28	13	157.7
Rotorua	975	55.2	+ 2.4	73.0	36.0	4.95	17	— 0.21	1.00	14	161.4
Gisborne	12	56.6	+ 1.1	72.5	37.1	2.62	15	+ 0.19	1.13	6	164.5
New Plymouth	160	56.2	+ 1.8	67.5	37.0	9.04	16	+ 3.41	3.50	4	170.7
Karioi	2125	51.0	+ 2.8	71.2	29.0	5.97	14	+ 1.72	1.58	17	
Napier	5	57.4	+ 0.9	79.8	39.8	1.59	7	— 0.31	0.85	17	207.9
Wanganui	72	57.2	+ 2.4	75.2	41.5	5.47	13	+ 2.25	1.60	5	188.0
Palmerston North	110	55.6	+ 1.7	72.3	36.0	3.60	14	+ 0.04	0.77	5	180.6
Waingawa	340	54.6	+ 1.9	75.0	33.0	3.39	15	+ 0.43	0.75	4	210.9
Wellington	415	55.2	+ 2.4	67.3	40.3	4.26	15	+ 0.03	1.07	4	213.7
Nelson airfield	5	53.7	+ 1.5	65.9	38.4	3.30	13	+ 0.04	0.92	12	207.7
Blenheim	12	55.0	+ 1.3	72.0	34.8	0.96	11	— 1.24	0.27	4	227.8
Hokitika	15	53.4	+ 2.4	70.3	38.0	11.72	18	+ 0.70	1.81	22	167.7
Hanmer	1270	53.2	+ 2.6	77.0	30.5	2.80	11	— 1.10	1.27	18	186.6
Christchurch	22	55.2	+ 2.1	77.5	35.8	1.18	7	— 0.77	0.44	15	235.1
Ashburton	323	55.2	+ 2.8	79.8	34.0	1.19	6	— 1.23	0.60	4	232.2
Timaru	56	55.2	+ 2.5	77.7	36.2	1.20	11	— 0.73	0.67	4	208.2
Alexandra	520	55.2	+ 2.8	80.2	28.1	0.80	10	— 0.42	0.17	26	193.6
Taieri	80	53.0	+ 1.9	72.2	31.8	3.31	14	+ 1.25	0.86	26	169.5
Invercargill airfield	9	52.4	+ 3.2	73.9	34.2	4.34	17	+ 0.86	1.18	26	159.6

Layers in Household Poultry Flock Need Two Types of Grit

THOUGH most household poultry keepers appear to realise that their laying birds require grit, many are somewhat hazy about the best kind of grit to feed and about the reason for which grit is fed. The two types of grit required and why they are needed are described in this article by the Animal Industry Division.

ANIMALS have teeth with which to masticate food before it enters the stomach to be further acted on by digestive juices. Birds have no teeth and have other means by which their food is "masticated" before passing on for the normal digestive processes. "Mastication" in a bird takes place in the organ known as the gizzard, which forms an important part of a bird's digestive system. Approximately round, and flattened on either side, the gizzard is largely constructed of powerful muscles. The interior is lined with a thick, leathery material covered in ridges. This sac-like lining can be readily removed from the interior, as it is when the gizzard is used for cooking. In a properly fed or healthy bird the gizzard contains pebbles or stones which are retained there for the grinding or disintegrating of food passing through. The grinding by the stones is effected by contraction and expansion of the enveloping powerful muscles of the gizzard.



Section of gizzard, showing the powerful muscles and lining with its ribbed surface. A—Glandular stomach. B—Duodenum. C—Tendon. D—Muscle. E—Mucous membrane.

Birds, including poultry, which feed on hard foods such as seeds or grain look for stones or other hard substances of a size that can easily be swallowed, as they need to keep a supply of hard material in their gizzards. With the continuous grinding process these stones become rounded and smaller, ultimately passing down the digestive tract to be voided with the droppings.

Grit for Laying Birds

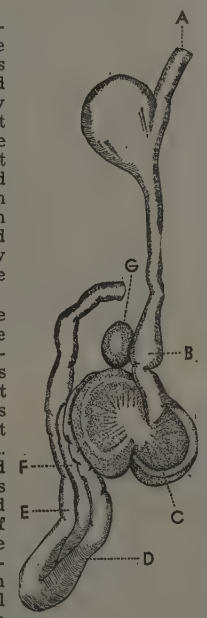
Many laying birds are kept inside a house and have no access to the ground outside where stones are to be found. Consequently it is highly desirable to have a small box of poultry grit, as it is usually termed, in the laying house open to the birds at all times. They will not eat a lot of this pebble grit, as the rate at which it is used up in the gizzard is slow.

If no metal grit is supplied, gizzards gradually become devoid of any grinding material. Fibrous food is then not broken up or adequately disintegrated in the gizzard and ultimately the gizzard muscles soften, as they have no hard material on which to work. This state leads to faulty or inefficient digestion of food. There can therefore be no question about the desirability of supplying grit to laying birds; it should always be available in the laying house.

Kind of Grit

From the description of the gizzard and its function a hard grit is obviously needed. In fact the harder the grit the better it is. In England poultry are given flint grit, which is extremely hard and consequently lasts a long time in the gizzard.

If possible, the grit should be angular or irregular in shape, as this makes it more efficient as a grinding agent in the gizzard. Smooth, rounded pebbles are less effective and tend to pass out of the gizzard more readily than angular chips. Such is the powerful action of the gizzard that pieces of glass have been smoothed and rounded inside it. The lining is so tough that no rough or sharp edge will injure it.



Crop, stomach, and duodenum. A—Oesophagus. B—Glandular stomach. C—Gizzard. D—First part of duodenum. E—Second part of duodenum. F—Pancreas. G—Spleen.

Reminders for January

AT this time of year adult birds begin to drop in production and non-producers should be culled. Light breeds such as White Leghorns should be suspected of going off lay when combs show indications of becoming dry and shrivelled. Heavy breeds such as Australorps, Rhode Island Reds, and crossbreds do not show such obvious signs of falling production and they, as well as the light breeds, should be checked by handling.

The birds should be caught and held and the palm of one hand placed over the pelvic and keel bones at the rear of the bird. These bones are triangular with the two pelvic bones uppermost. If there is less than two fingers' width between the pelvic bones and less than three between the pelvic and keel bones, the bird is not paying its way and should be removed and used for table purposes.

New season's pullets should receive all the mash and grain they can eat without wasting it. Adequate supplies of fresh, cool water should be given daily in containers left out of direct sunshine.

Now is a suitable time to treat growing stock against roundworm infestation. Birds over 8 weeks old and under 12 weeks may be given a 1 c.c. carbon tetrachloride capsule. Birds over 12 weeks old may receive a 2 c.c. capsule. Birds should be inspected for body lice at the bases of the feathers next to the skin, particularly in the fluffy feathers near the vent. Birds infested with lice should be treated without delay. A drop or two of nicotine sulphate or a louse powder should be applied into the feathers round the vent and under the wings. A further application 10 days later will destroy new lice which hatch from the eggs or nits.

Red mites under the perches or in the fittings of the fowl house can be controlled by painting affected parts with a solution of kerosene and used sump oil.

Any hard metal grit, preferably irregularly shaped, is suitable for poultry. The box of grit should be placed on a wall well above the litter. Unless this is done the box is soon filled to the top with litter from the floor when the birds scratch for their grain and the birds are unable to get at the grit. If birds are without grit for a considerable period and then are given an ample supply, they will tend to glut themselves with it for a short time and a considerable amount of grit may be passed with the droppings. This may worry poultry owners, but the phase will rapidly pass and the birds will not be injured.

Metal and Shell Grits

Confusion sometimes occurs between the uses of metal grits and shell grits. Laying birds require a substantial quantity of lime; a relatively small proportion is needed for their bodies and a large amount for forming shells on their eggs. A small percentage of ground limestone is commonly incorporated in laying mashes to give birds a steady supply of lime. A bird's requirement of lime will vary considerably, however, according to the rate at which she is laying. The more eggs she lays the more lime will be required.

A box of "grit" rich in lime **in addition to a metal grit** should therefore be available always to laying birds. Birds appear to regulate their intake of lime grits according to their needs.

Crushed oyster shells or pipi shells are commonly used. Shell grits are not hard enough to be really efficient for grinding food in the gizzard. If shell grits were as hard as metal grits, they would not serve their particular purpose of affording a ready supply of lime.

From time to time hard limestone grits that are claimed to serve the double purpose of being hard enough to grind food in the gizzard and at the same time break down sufficiently to release lime for shell formation are put on the market. It is doubtful whether the claim has been either satisfactorily established or refuted. However, most commercial poultry producers still prefer a shell grit and a metal grit for their birds.

INSTRUCTION OR RESEARCH?

GRADUATES in science or agriculture and holders of agricultural diplomas are needed to fill vacancies in the Department of Agriculture.

Positions are available for extension work in the field or research work at the Department's research stations.

Commencing salaries are good: Holders of B.Sc., £575; M.Sc., £615; M.Sc. with 1st class honours, £705. Holders of B.Ag.Sc., £615; M.Ag.Sc., £665. Promotion prospects are good. Staff are given the opportunity to attend Departmental courses and conferences of professional societies.

Inquire at any office of the Department of Agriculture or write to the Staff Training Officer, P.O. Box 2298, Wellington.

Temporary Docking Yards of Jute Nets

FOR the construction of temporary docking yards jute nets rather than wire netting are worth consideration because of their ease of transport and speed of erection. The material is about the same weight as that in sugar bags.

Ewes from which lambs have been taken are easily held in a yard of this nature, because they will usually stand back at a distance rather than try to break out.

The netting can be fastened to wooden stakes by staples driven lightly over a reinforcing rope running full length through a hem on either edge. If iron standards are used, eyelets may be inserted in the net hem at regular intervals to allow the use of baling twine, which can be cut when docking is finished.

A finished height of 39in. by 25yds. long is a useful size for handling. The nets may also be used to extend a wing to the yard opening for gathering in ewes and lambs; if the yard is erected on an existing fence, the netting may be used to secure the part of the fence left uncovered to facilitate filling.

—C. R. M. JONES, Livestock Instructor,
Department of Agriculture, Wairoa

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during October and for the 3 months ended 31 October 1955, with comparative figures for the same month and 3 months of 1954, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage inc. or dec.
October 1955	22,180	387	22,567	—
October 1954	21,420	402	21,822	—
Increase or decrease	+760	—15	+745	+3.414
3 months ended 31/10/55	48,858	789	49,647	—
3 months ended 31/10/54	47,030	808	47,838	—
Increase or decrease	+1,828	—19	+1,809	+3.781

Butter in store at 31 October 1955 was 23,036 tons

CHEESE

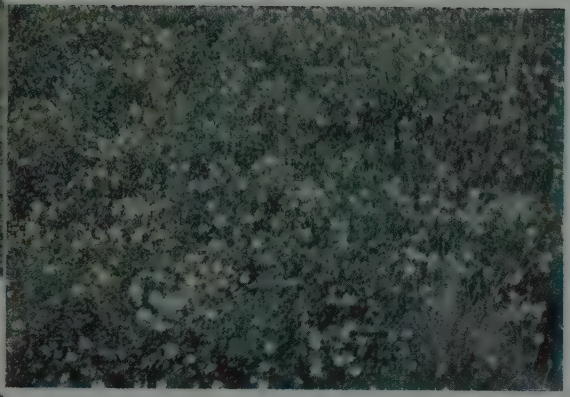
Period	White (tons)	Coloured (tons)	Total (tons)	Percentage inc. or dec.
October 1955	9,669	1,495	11,164	—
October 1954	9,786	3,093	12,879	—
Increase or decrease	—117	—1,598	—1,715	—13.316
3 months ended 31/10/55	17,683	2,034	19,717	—
3 months ended 31/10/54	19,052	4,100	23,152	—
Increase or decrease	—1,369	—2,066	—3,435	—14.837

Cheese in store at 31 October 1955 was 12,717 tons

If these figures are converted into butterfat equivalent, there is an increase of 0.449 per cent. in butterfat graded for the 3 months as compared with the corresponding period of the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place from time to time they are not necessarily a true indication of production trends.

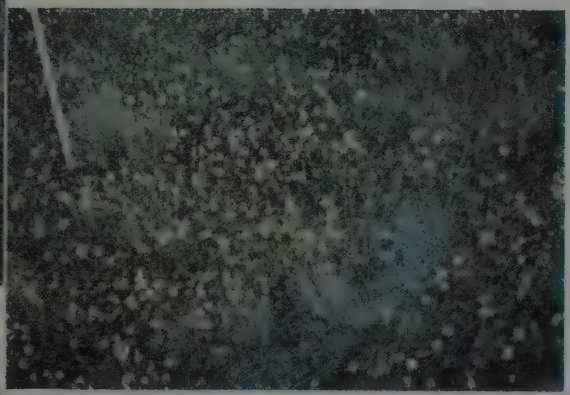
Tussock Grassland Improvement

Right—Clovers established by subsurface drilling with grassland tips and with fertiliser and lime. Left—Natural cover: Sparse, unthrifty fescue tussock with blue tussock and stunted matagouri and tauhinu strongly invaded by browntop and sweet vernal.

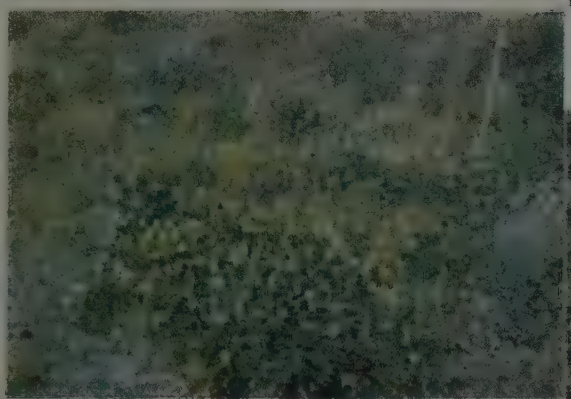


Method of seeding (drilled section): Subsurface introduction with grassland tips.

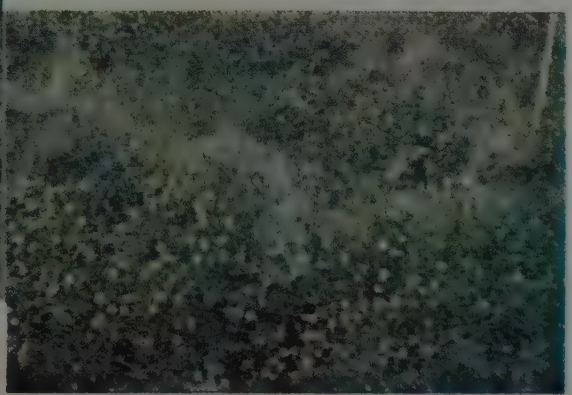
Method of seeding (pitchpoled section): Surface broadcast.

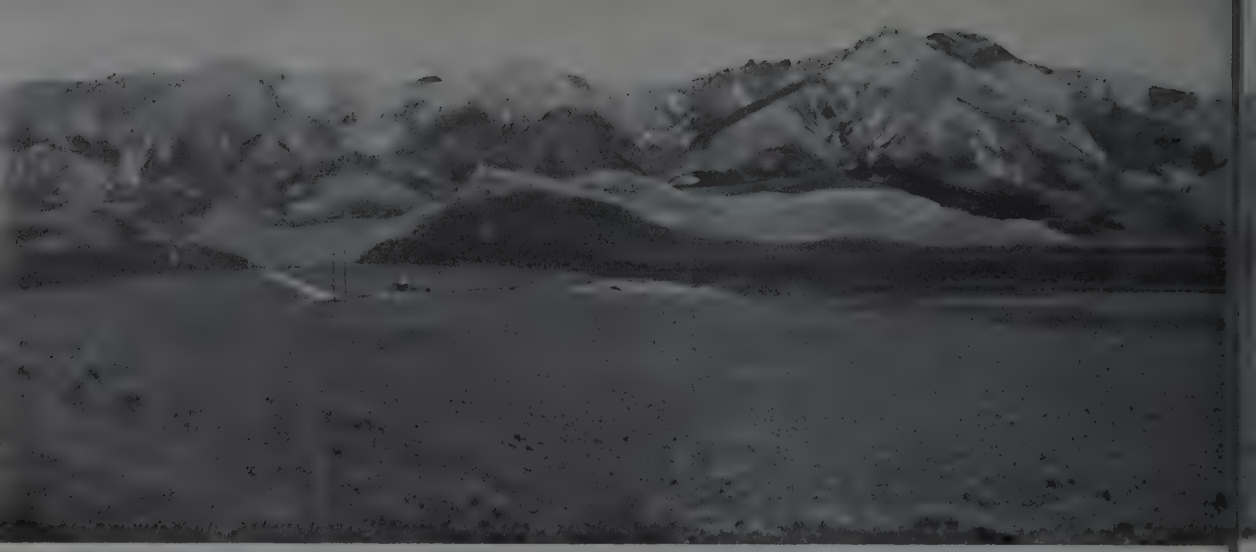


Method of seeding (broadcast section): Seed and fertiliser oversown on undisturbed surface.



▲ Fertiliser treatment (drilled section): Superphosphate alone.
Fertiliser treatment (drilled section): Superphosphate plus lime. →





High Country Tussock Grassland Improvement in Canterbury

By A. R. DINGWALL,
Assistant Fields Superintendent, Department of Agriculture, Christchurch

THERE is a growing interest in the possibilities of improving high country tussock grasslands by the introduction of clovers accompanied by topdressing. This article gives results of a trial on ploughable tussock country in Canterbury.

THE plant communities of these sub-alpine regions, dominated in their virgin state by hard tussock (*Festuca novae-zelandiae*) or silver tussock (*Poa caespitosa*), have always been naturally devoid of leguminous plants, except for the relatively sparse population of native brooms (*Carmichaelia* spp). During a century of farming occupation many of these areas have become strongly invaded by aggressive but low-producing exotic grasses such as browntop (*Agrostis tenuis*) and sweet vernal (*Anthoxanthum odoratum*), to the detriment both of the original vegetation and the carrying capacity of the high country runs.

The moderately acid soils of these natural grasslands are inherently low in phosphate and available calcium and nitrogen. In some instances they have also proved deficient in other essential plant nutrients such as sulphur and molybdenum. Thus on unimproved high country swards dry-matter production is limited and the herbage produced is seasonally deficient in proteins and certain essential minerals, deficiencies that could be overcome largely by the inclusion of leguminous plants.

Introducing Legumes

Aerial oversowing or the employment of grassland coulter tips for sub-surface drilling of seeds and fertiliser offer practical means of introducing legumes over vast areas of tussock grassland swards without an immediate disturbance of the existing vegetative cover. The transformation accompanying the establishment of clovers under such conditions is shown in the upper left illustration on page 553.

Though the sowing of clovers in tussock grasslands is by no means a recent practice, the full significance of introducing legumes into these environments has yet to be determined. Opinions may differ as to the eventual outcome of establishing high-fertility-demanding legumes in sub-alpine tussock communities, but it is generally conceded that their introduction can result in an early improvement in carrying capacity on the sown areas. It is also considered that such introductions, together with the more concentrated grazing afforded, should in time lead to build-up of soil fertility on improved areas. If this desirable result accrues, subsequent establishment of palatable and productive grass species into tussock grasslands may be greatly facilitated.

Difficulties with Grasses

Whereas experiments and farming practice have shown that clovers can be readily introduced into most hard tussock and silver tussock areas, useful grasses are not nearly so readily established in the initial stages of improvement. Under certain circumstances, especially on the better-class silver tussock country under favourable rainfall, grasses such as cocksfoot (*Dactylis glomerata*) and tall oat grass (*Arrhenatherum elatius*) can often be established with the original sowing.

Nevertheless, failing some form of surface cultivation the successful introduction of productive grass species into most of the high country tussock grasslands, particularly where hard (fescue) tussock forms or formed the dominant constituent, must await a period of clover growth and grazings.

High Country Trials

As part of the programme of tussock grassland research a trial was begun in November 1953 in the Broken River area, "Flock Hill" Station, within the watershed of the upper Waimakariri River. The trial is on ploughable country at an altitude of approximately 2400ft. in the 45in. rainfall belt.

The natural vegetative cover (see upper left illustration on page 553) consists of unthrifty hard and blue (*Poa colensoi*) tussocks with stunted matagouri (*Discaria toumatou*) and tauhinu (*Cassinia fulvida*), strongly invaded by browntop, sweet vernal, and Yorkshire fog (*Holcus lanatus*).

Methods of Seeding

The main object of the trial was to determine the comparative effectiveness of three methods of seeding for establishing grasses and clovers in tussock swards.

Broken River trial area with Torlesse Range in background.

The three methods were: Subsurface drilling of seed and fertiliser with grassland tips; orthodox broadcasting of seed and fertiliser on an undisturbed surface, as in ordinary and aerial oversowing; and surface broadcasting on a surface disturbed by pitchpole harrowing.

The first two methods retain the natural ground cover, but in the third method much of the existing tussock is uprooted, the extent of the disturbance depending largely on the severity of the pitchpoling and the original density and type of vegetation. Pitchpole harrowing also gives a certain amount of tilth to allow better seed coverage (which is improved by rolling after sowing) and reduces plant competition in the early stages of establishment of seedlings from sown seed.

The seeds mixture sown (at 21lb. per acre) in this trial included perennial ryegrass (*Lolium perenne*), cocksfoot, alsike (*Trifolium hybridum*), Montgomery red clover (*Trifolium pratense*), and white clover (*Trifolium repens*).

The comparative results from the three seeding methods, as seen in January 1955, the second season after sowing, are shown in the upper right, middle left, and middle right illustrations on page 553.

Clover establishment and growth where subsurface introduction of seed was made by grassland tip drilling has given virtually a complete ground cover of legumes. The same degree of cover has not yet been achieved by either of the other two methods, even though they are by no means unsatisfactory.

During the early stages of establishment and through the first season, when the plots were subject to continuous and moderately severe grazing, the difference between the drilled and surface-sown areas was even more marked.

Differences in clover establishment and growth on the ordinary broadcast and pitchpoled areas have never been so distinctly marked, any difference being in favour of pitchpoling. Pitchpoling has, however, encouraged the establishment of cocksfoot plants, which are not as yet noticeable in the drilled or broadcast sections.

Figures for dry-matter herbage production during the second season (from September 1954 to April 1955) confirm observations of response differences and relative merits for clover establishment. These figures are given in Table 1.

TABLE 1—DRY-MATTER PRODUCTION IN METHOD OF SEEDING TRIAL
(September 1954 to April 1955)

Method of seeding	Dry-matter production lb. per acre	Relative production
Drilled	3,507	200
Pitchpoled ..	1,806	102
Broadcast ..	1,770	100

Response to Fertilisers

Soil tests of the area taken at the start of the experiment gave the following analytical results: pH, 5.6; available calcium, 2; phosphorus (P_2O_5), 1; potash, 8; and molybdenum, 0.08 p.p.m. With such tests responses to lime, phosphates, and molybdenum are to be expected.

A base dressing of superphosphate at 1¾cwt. per acre was used for all plots and cross treatments of lime at 10cwt. per acre and sodium molybdate at 2½oz. per acre were added. The layout gave fertiliser treatments of superphosphate alone, phosphate plus lime, and phosphate plus molybdenum.

The results achieved and also as observed during the second season are shown in the upper right, lower left, and lower right illustrations on page 553.

In the establishment and initial season's growth the superphosphate plots proved very disappointing, even on a section of the trial where this fertiliser was used at up to 6cwt. per acre at the time of sowing. Seedling establishment was relatively sparse and initial growth showed distinct chlorosis (loss of colour) of leafage.

A good strike and early response were obtained with phosphate plus lime, but by far the most outstanding response, as indicated by density of strike, growth vigour, and colour of herbage was achieved with phosphate plus molybdenum. Throughout the second season the sections treated with superphosphate and with phosphate plus lime have shown marked improvement. Toward the end of the second season ground cover of clovers on the limed plots appeared little inferior to and growth equal to, if not better than, that on the molybdenum plots. The limed plots had received a further dressing of 10cwt. of lime—making a total of 1 ton per acre—and all plots received a second application of superphosphate at 1cwt. per acre in August 1954. The initial molybdenum application of 2½oz. per acre has not yet been repeated.

Herbage production resulting from the various manurial treatments during the period September 1954 to April 1955 is indicated in Table 2.

TABLE 2—*DRY-MATTER PRODUCTION AND MANURIAL TREATMENTS
(September 1954 to April 1955)

Fertiliser applied	Dry-matter production lb. per acre	Relative production
Superphosphate ..	2,415	100
Super. + lime ..	3,217	133
Super. + molybdenum	3,796	157

* Production on plots drilled with grassland tips.

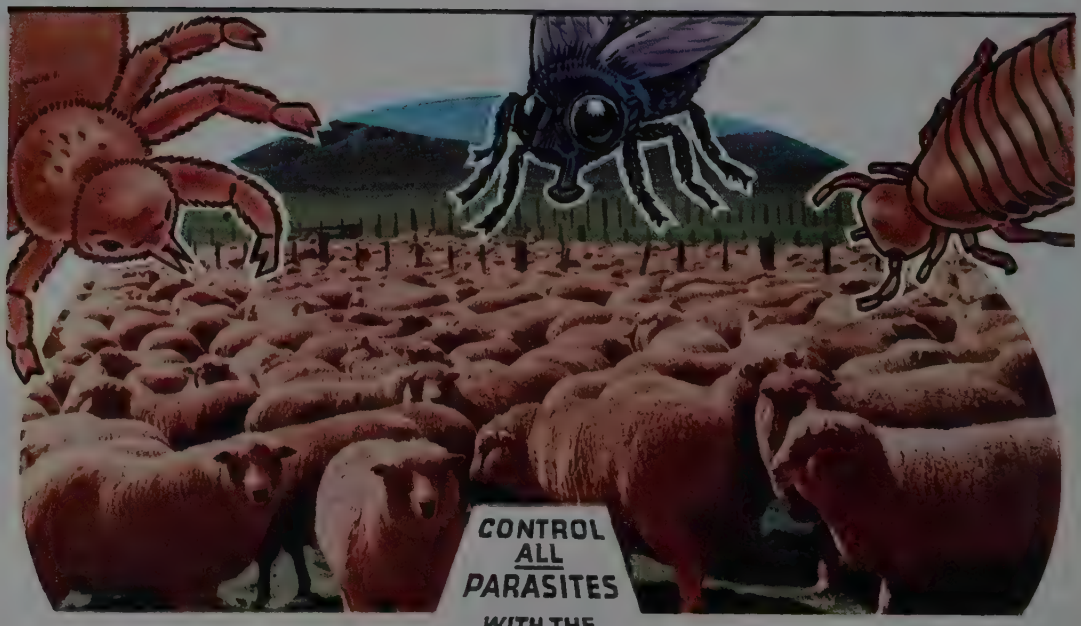
Conclusion

Evidence from this trial indicates that red clover, alsike, and white clover can be readily established in fescue tussock high country by the three seeding methods employed, but that subsurface drilling with grassland tips gives a much more even strike and better herbage production in the first two seasons than either broadcasting on an undisturbed surface or after pitchpole harrowing.

On the other hand the inclusion of grass species, perennial ryegrass and cocksfoot, in the initial oversowing does not appear warranted unless some form of prior surface cultivation such as pitchpole harrowing is adopted or the existing cover is naturally open. This is especially so where the tussock grassland is already strongly invaded by such aggressive exotics as browntop, creeping fog (*Holcus mollis*), sweet vernal, and Yorkshire fog.

Though in this trial the results from superphosphate have not been encouraging, experiments and farming practice in some other localities throughout the high country of Canterbury have shown that there are areas where phosphate alone will give immediate and successful results. Similarly, it has been shown that sulphur, which occurs as the calcium sulphate impurity of superphosphate, may play as important a part as the phosphorus fraction of superphosphate in the establishment of clovers in certain tussock areas.

However, successful early establishment of clovers in the hard (fescue) tussock grasslands of the upper Waimakariri River watershed would appear to depend on the use of lime (preferably applied 6 to 12 months in advance of seeding) and/or molybdenum in addition to phosphate fertilisers.



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Collection, Extraction, and Storage of Seed

TREE seed for the raising of seedlings has been very scarce in most parts of New Zealand and those who have set out to raise their own planting stock have usually had to collect their own seed. The seed-collecting season will soon be here and those wanting seed would be wise to cast round now for suitable sources of the species desired.

COLLECTION, extraction, and storage of tree seed are described in this article by W. H. Jolliffe, Extension Forestry Officer, New Zealand Forest Service. It is the tenth in a series on trees on the farm which was begun in the March 1955 issue.

Collection

Genetics is as important with trees as it is with any other farm crop and great care should be taken to collect seed only from trees with desirable characteristics. The temptation to take seed from a tree whose only attraction is that it is easy to collect from must be sedulously avoided and, since trees cross-pollinate freely, an isolated good tree in an otherwise poor stand is not a good source of seed. Seed should not be collected from very young or from very old trees; the most fertile seed comes from trees in middle age.

Some trees bear good crops of seed only occasionally; as long as 7 years may intervene between "seed years". This must be borne in mind when collections are planned, because advantage must be taken of a good crop for a supply to carry over the lean years.

Cones or other fruit must be ripe before they are collected. On some species (for example, radiata and muricata pines and macrocarpa) cones remain closed on the trees for some time, enabling collection at any time of the year. With others (such as Corsican pine, Lawson's cypress, thuya, and redwood) the cones open as soon as they are mature and the best seed (the heaviest) may be shed before they are collected unless examination has been made beforehand in order to choose the right time for collection. The less woody cones can be sliced with a sharp knife or slasher and nearly mature seed should be firm, waxy, and have a brown coat.

Collection from standing trees may be done by climbing, from ladders, or by spreading sheets on the ground underneath the tree. The choice of method will naturally vary with the species being collected—whether the seeds are bare (for example, oak and beech) or enclosed in fleshy fruits or cones. Collection from felled trees is easiest, but the cones must have been mature at the time of felling and it is desirable to see the tree standing to be certain of its suitability as a parent tree. Half sugar bags tied round the waist or slung from the shoulder are handy to pick seed into.

Extraction

Seed collected by a sheet spread underneath the tree will usually require only sieving and some hand picking to remove dirt and foreign matter. Winged seeds should have their wings removed, either by wetting and immediately sun drying them or by rubbing them in a sugar bag.

Fleshy fruits should be softened by being steeped in water and the seeds separated from the pulp by thorough washing. After the latter process they should be dried as soon as possible in the sun.

Most cones when mature open readily enough if spread out on canvas sheets in the sun, but some with very woody cones, especially radiata and muricata pine, may require artificial heat to open them. To avoid cooking the seed the temperature should not be allowed to rise above 130 degrees F. except for the initial period before the scales begin to crack. The cones when fully open should be shaken to dislodge all the seed. Wings should be removed by "dewing" or rubbing and the seed cleaned by sieving it through suitable size meshes.

Storage

Tree species vary considerably in the length of time their seed remains able to germinate. Kauri seed, for instance, is extremely short lived, whereas some hard-coated seeds will survive for 10 years. It is wise, however, to discard most lines when they are over 3 years old, even if storage conditions have been ideal.

Seed must be thoroughly air dried before storing and all lots should be labelled with name and date. The best temperature for storage is between 32 degrees and 40 degrees F. However, some species such as ash do best when stratified in sand; that is, a layer of sand is put in the bottom of the container, then a layer of seed, then another layer of sand, and so on. When stratified seed is sown the sand and seed can be sown together.

Seed extraction. Left—Heating radiata pine cones in iron trays in an oven made from an old square iron tank. The tank is on its side with a fire underneath; 2in. to 3in. of sand is spread over the floor to regulate the heat. Right—Tree seed spread on a canvas sheet in the sun after wetting to remove wings. The seed is stirred occasionally with a rake.

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EXPERIMENTS with the use of hormone-type weedkillers for the control of sweet brier (*Rosa eglanteria*) were first conducted in the high country tussock grasslands of the upper Waimakariri River area during the 1946 to 1948 seasons. These early trials compared 2,4-D (2,4-dichlorophenoxyacetic acid) with standard sodium chlorate.

A further series employing the later-developed esters of 2,4,5-T (2,4,5-trichlorophenoxyacetic acid) began in 1951 and is still proceeding. More recently newer weedkillers, such as the urea compounds, mixtures of borates and chlorates, 4-C (4-chlorophenoxyacetic acid), and 2,4,5-TP (2,4,5-trichlorophenoxpropionic acid) have also been included.

Treatments have included coverage sprays and basal sprays and dustings and have been confined largely to the treatment of large, well-established plants, though some work has been done on regrowth from cut stumps. The treatments have been applied at all the main seasonal stages of growth.

RESULTS: HORMONE WEEDKILLERS

2,4-D proved relatively ineffective against sweet brier and the mixed esters of 2,4-D and 2,4,5-T compounds appear to depend on their 2,4,5-T content for effectiveness. Both the butyl and butoxy ethanol esters of 2,4,5-T have given better results than the polyethylene glycol ester of 2,4,5-T and have proved moderately efficient as coverage sprays when applied to well-established bushes, though repeat applications are necessary.

For spraying during the full-leaf (flowering to petal fall) period (November-December in the upper Waimakariri) dilution strengths of 1 in 250 to 1 in 500 have proved satisfactory. Spring and autumn sprayings require stronger solutions of about 1 in 100. Coverage sprays must be complete, 3 to 4 pints of spray per plant being required when the solution is applied with knapsack equipment to individual bushes. When well-established, dense stands of large bushes are treated with orthodox high-volume equipment 400 to 500 gallons of solution per acre would be needed for adequate coverage.

Very satisfactory results were achieved by applying basal sprays of the esters of 2,4,5-T in diesel fuel (1 in 25) during the plants' dormant period (June to July) and using 1 pint of solution per plant. Good kill was also achieved when regrowth on cut stumps was sprayed with single applications of 1 in 250 and 1 in 500 solutions of 2,4,5-T esters, provided sheep had access to and browsed the treated shoots. For this treatment 1 to 1½ pints of solution per stump was required.

RESULTS: OTHER CHEMICALS

As an over-all application boron-chlorate mixtures appear less satisfactory than 2,4,5-T applied in the same way. On young autumn regrowths in stocked areas a 5 per cent. solution of sodium chlorate applied at 1 to 1½ pints per bush has been satisfactory. The urea compounds CMU and PMU show distinct promise.

—A. R. DINGWALL

EARTHWORMS

ARISING from the favourable publicity given to the activities of earthworms and their ability to improve unploughable hill pasture in the Raetihi district of the North Island, a trial with earthworms was undertaken in the Glenledi district near Milton. Activity of soil organisms, particularly earthworms, has always been looked on as a sign of good soil fertility and the experiment confirms this view.

Six colonies of 25 worms of the species *Allolobophora caliginosa* were placed in a field at points a chain apart in August 1945 in an 18-month-old sward that was mainly browntop and ryegrass with some crested dogstail, timothy, cocksfoot, white clover, and red clover. Weeds and bare bare ground comprised 15 per cent. of the ground cover.

Little evidence of worm activity was noted until May 1949, when the worm-implanted area was noted to be greener and fresher than the non-wormed area and worm casts could be found readily in the vicinity of the liberation points. As the worms spread their effect could be noted in the colour, vigour, and density of the sward, and when the field was ploughed in spring 1954, boxwood (*Cassinia* spp.) and manuka were invading the sward of the non-wormed area. In 9 years the 6 colonies of earthworms had spread over an area of approximately ¼ acre, on land which had been limed fairly heavily, though the phosphate status was low.

Allolobophora caliginosa is common in many parts of South Otago, but is not found in the district where the trial was undertaken or in the adjoining districts of Akatore, Bull Creek, and Taieri Beach. Worms of this species may have been present in the past and died out as a result of the rather bad treatment the soils in this area received in the early days, when they were extensively cropped. With the use of lime and phosphates and the utilisation of the land for sheep farming the reintroduction of this species of earthworm into the area appears to be worth while for building up soil fertility.

—J. G. RICHARDS

HEADING PHOTOGRAPH: Sweet brier sprayed with 2,4,5-T.

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Losses from FACIAL ECZEMA Can Be Prevented

By J. F. FILMER,
Director, Animal Research Division, Department of Agriculture, Wellington

DURING the autumn of 1955 facial eczema caused serious losses of sheep and cattle in many districts; similar losses have occurred in a number of previous years. These could have been prevented and this article indicates how losses can be prevented in future.

TO do this it is necessary to answer the following questions:—

What is facial eczema?

What causes facial eczema?

Where does facial eczema occur?

When does facial eczema occur?

How can facial eczema be prevented?

Can facial eczema be cured?

What should be done when facial eczema occurs?

What Is Facial Eczema?

Facial eczema is a disease of the liver of sheep and cattle which may or may not be accompanied by skin lesions. The severity of the liver damage may vary considerably. In early, mild cases very little can be seen with the naked eye. Usually, however, the surface of the liver shows a fine mottling which may affect part or the whole of the liver. Often there are areas which are more seriously affected than the remainder, and this causes a blotchy appearance. In later stages of the more serious cases the liver becomes much harder than normal and its shape may be grossly distorted.

The skin lesions affect only the uncovered white or light-coloured areas. Thus in sheep the most commonly affected parts are the ears, nose, and eyelids, and in shorn sheep the back. In dairy cows the udder and any other white or slightly coloured areas are affected. The first sign usually seen in sheep is a swelling of the ears. Closer examination shows that the nose and eyelids are also swollen and the whites of the eyes are usually inflamed and yellow. Later the affected areas become covered with scabs. In dairy cows soreness of the teats and udder is usually the first sign.

What Causes Facial Eczema?

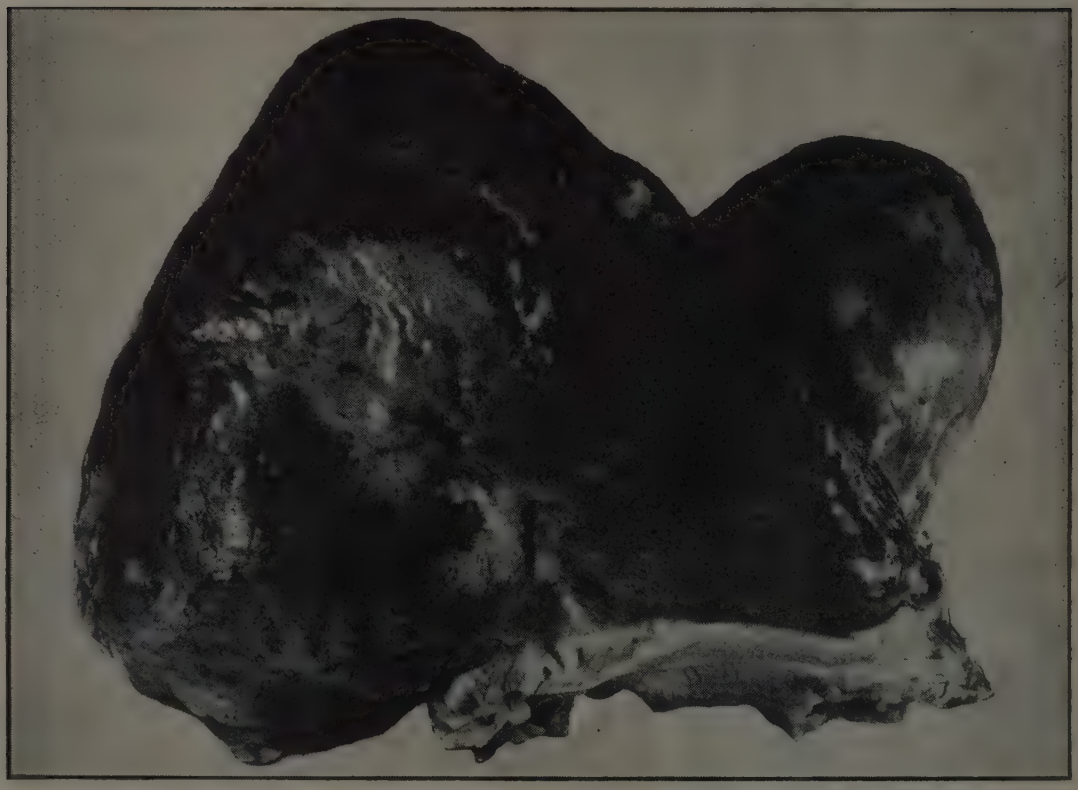
The liver damage is caused by a substance which develops in perennial ryegrass, short-rotation ryegrass, and possibly other plants. This has been proved quite conclusively. Pasture from paddocks where facial eczema occurs has been dried and forwarded to the Wallaceville Animal Research Station, where facial eczema does not occur. There it has been fed to lambs bred at Wallaceville and has produced characteristic liver damage. It has also caused typical liver damage in guinea pigs which have never come into contact with the disease.

The skin lesions are caused by a substance known as phylloerythrin, which is formed from chlorophyll in the gut. In normal sheep and cattle it goes from the gut to the liver and is then passed out in the bile. When the liver is damaged the phylloerythrin gets into the bloodstream and renders the uncovered, light-coloured skin sensitive to light. It is for this reason that sheep with facial eczema seek the shade. Photosensitisation does not always occur in facial eczema, because sometimes the liver damage is not bad enough or does not occur fast enough to interfere with the liver's ability to excrete phylloerythrin. Other functions of the liver may, however, be impaired and many sheep which do not show any skin lesions may lose condition and even die as a result of liver damage.

Where Does Facial Eczema Occur?

Facial eczema has occurred in most North Island districts and occasionally in Nelson and Marlborough. Fat lamb and dairy farms are most prone to the disease, but it is not rare on hill

Early case of facial eczema showing drooping, swollen ears and swelling of face and eyelids.



Liver badly affected with facial eczema, showing gross distortion and extreme development of white fibrous tissue.

country. It has occurred at intervals for over 50 years, and in most districts the areas which have been affected are well known. All such areas should be regarded as potentially dangerous, as should any similar newly developed country.

When Does Facial Eczema Occur?

Facial eczema occurs only in autumn. No cases have been reported before 1 February and no new cases after 30 April, though old cases may continue to show symptoms much later than this. Fortunately the disease does not occur every autumn.

The most important feature of the dangerous years is that they are hotter than normal; this may apply to the whole of the summer and autumn, as in 1937-38, or to a shorter period, as in 1955. In 1955 temperatures in most districts were about normal up to the end of January. The first half of February was from 2 degrees to 4 degrees above normal and the second half of February from 4 degrees to 10 degrees above normal. The first half of March was 3 degrees to 7 degrees above normal and the second half of March was about normal, but temperatures in the first half of April were again about 1 degree to 4 degrees above normal.

Facial eczema is most common in an autumn which follows a hot, dry summer in which grass dries off or remains green but makes little growth. The disease seldom occurs after a cool, wet summer in which pasture grows rapidly throughout. It has never been known to occur in a late, cold autumn.

In some years the outward signs of facial eczema may occur within a few days of the eating of dangerous pasture. More usually, however, skin lesions are not seen for 2 to 3 weeks after the pasture first becomes dangerous, by which time it has usually become safe.

How Can Facial Eczema Be Prevented?

Precautionary measures for the prevention of facial eczema must be based on the principles which have been outlined. Because the disease is caused by a liver-damaging substance in the pasture, it can be prevented only by ensuring that sheep and cattle do not eat this pasture. The method of doing this will vary from farm to farm and will be different for different classes of stock.

However, no method can hope to be successful unless it prevents stock from eating pasture containing the liver-damaging factor. To do this it is necessary, in an area where facial eczema occurs, to make careful plans not later than January.

At this time each farmer should ask himself the following questions:—

1. Is facial eczema likely to occur this year?

2. If so, what paddocks on my farm are likely to be dangerous?

3. Are there any paddocks which I know will be safe?

4. When will I take precautions?

5. What precautions am I going to take?

6. For how long will I apply them?

Is Facial Eczema Likely to Occur This Year?

If the weather is hotter than normal, and particularly if it has been dry enough to depress the growth of pasture even though it has remained green, the answer is "Yes, facial eczema may occur this year". If the temperatures have not been above normal and sufficient rain has fallen to keep pastures growing well, the answer is "Facial eczema will not occur if this type of weather continues for the rest of the summer. If an unusually hot period occurs later, however, facial eczema may still occur."

What Paddocks Are Likely to Be Dangerous?

Only two grasses have been proved to cause facial eczema—perennial ryegrass and short-rotation ryegrass. The disease has occurred, however, in many paddocks in which these grasses were present in only small quantities, if at all. Any paddock in which facial eczema has ever occurred is potentially dangerous and on most farms all pasture paddocks should be regarded as suspect. Lucerne paddocks have often proved dangerous, though it is not known whether this is due to lucerne or to grass weeds.

Are There Any Safe Paddocks?

The only pasture species known to be safe is white clover. In Poverty Bay, where this can be grown as a pure stand, no cases of liver damage have ever occurred in lambs grazing it. It must not be concluded, however, that a clover-dominant pasture is safe. Such pastures may contain significant amounts of ryegrass and may be very dangerous. The brassica crops rape, chou moellier, kale, and turnips are safe provided they are reasonably free from weeds, particularly grasses.

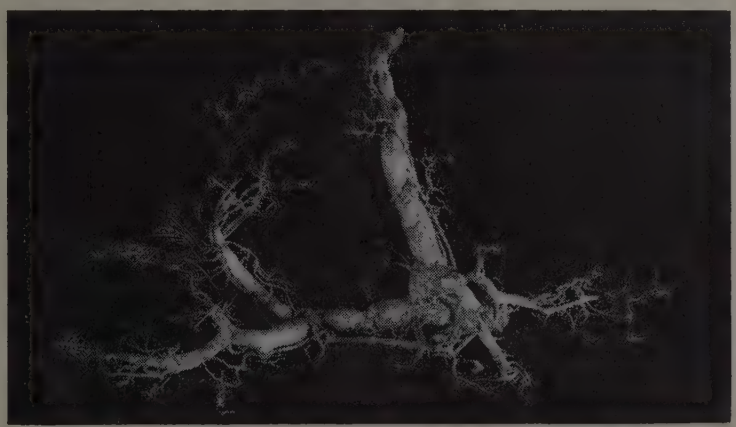
When Should Precautions Be Taken?

In a dangerous year precautions must be taken as soon as sufficient rain falls in autumn to start the pasture growing. Obviously every farmer must answer this question for himself.

Temperatures do not vary greatly within a district, and Departmental officers and other professional advisers can indicate if the season is likely to be dangerous. Rainfall, however, can vary greatly in small areas. Farmers would be well advised to keep rain gauges, which can be bought quite cheaply. Precautions should be taken as soon as ¼in. of rain has fallen, unless this is accompanied by a really cold change.

▲ Cast from normal sheep's liver. The white vessels are the bile ducts and the darker vessels the hepatic artery and its branches.

▼ Cast of bile duct system from the liver shown on opposite page. Most of the small bile ducts have disappeared and the main ducts are grossly enlarged. The smaller vessels running parallel to the main bile ducts are the hepatic artery and its branches.



What Precautions Should Be Taken?

The object must be to ensure that stock do not eat dangerous pastures. Three classes of stock should be considered separately; ewes and other mature sheep, hoggets, and cattle.

Safe crops will not generally be available in sufficient quantities to permit their being used for ewes and other mature sheep. The most practical method of protecting these is to concentrate them in such small areas that their consumption of pasture will be negligible. This will mean a concentration of at least 100 sheep per acre. In many cases this will not be enough.

Pasture can grow at the rate of 500lb. of green grass per acre per day, and 5lb. of toxic grass per day can produce serious liver damage in sheep. After sheep have been shut up for 24 hours there should be no grass left in the paddock; if there is, the concentration is too low and should be increased at once. Provided adequate water is available, the concentration cannot be too high.

Hay should be fed at the rate of 2lb. per sheep per day to prevent loss of condition, but even if no hay is available, the above rules governing rate

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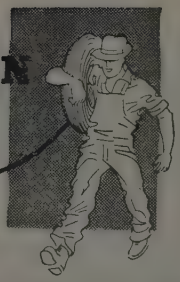

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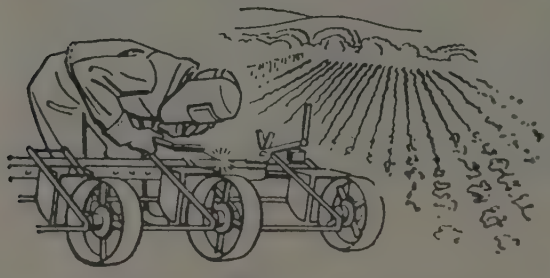

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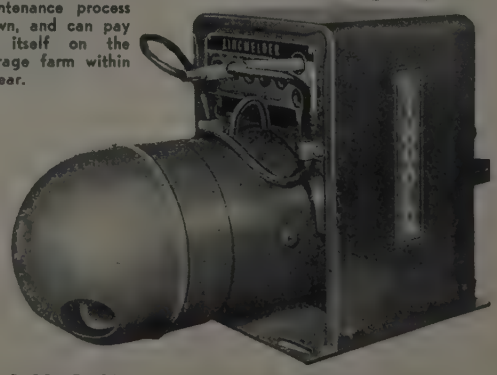

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of stocking should be strictly observed. Fourteen days' complete starvation will do no serious harm. During this period the ungrazed pasture grows rapidly and when sheep are turned on to it they soon regain any lost condition.

Shutting up during tupping will reduce the number of twins, but usually results in a short lambing period. An outbreak of facial eczema in ewes will cause a far greater reduction in the number of lambs reared than will a period of starvation during tupping.

This valuable method of preventing facial eczema has been criticised because it has failed when not properly applied.

Three things are essential for its success: It must be applied immediately rain falls; the concentration must be high enough to ensure that no grass is left in the paddock 24 hours after sheep go into it; sheep must be kept shut up in the same paddock until pasture becomes safe. On no account must sheep be allowed out for short periods while the pasture remains dangerous.

Unfortunately this method cannot be recommended for hoggets, unless very good hay is available. Though shutting up without hay will prevent facial eczema in hoggets, they receive such a severe check that they remain unthrifty for the rest of autumn. The only satisfactory method of protecting hoggets is to graze them on pure white clover, rape, chou moellier, kale, or turnips. Clean crops of maize are usually safe, but lambs do not do very well on them. Lucerne stands are not safe. If safe crops are not available in a dangerous season, lambs should be sent to the works as soon as they are killable. It is better to accept light weights than risk facial eczema.

If lambs are not killable and neither good hay nor safe crops are available, they should be turned into the paddocks which appear safest. Every farmer must learn these from experience; usually they will be the roughest pastures and will contain little ryegrass. Hill pastures are usually safer than flats, but gullies containing ryegrass are very dangerous and lambs tend to concentrate in them.

Though cattle are less susceptible to facial eczema than sheep, in really bad years like 1938 and 1955 they have been affected. The principle underlying protective methods is still the same. Consumption of dangerous grass must be prevented.

Probably the only satisfactory way to protect dairy cows and at the same time maintain their milk production is to feed them on safe crops and silage. Dry cows, calves, and bulls should be concentrated in small areas and fed hay or silage. The concentration should be not less than 40 cows or 80 calves per acre. Bulls should be kept in yards and allowed no pasture.

Beef cattle, if they are killable, should be sent to the works before facial eczema occurs; if they are not killable, they can be protected in the ways indicated for dairy cows. If crops, hay, or silage are not available, cattle should be grazed on the safest pasture, but full protection may not be achieved by this.

How Long Should Precautions Be Maintained?

Precautions must be maintained until there is a marked change in the weather and the pasture hardens. The change may be a pronounced fall in temperature or a change from warm, showery conditions to hot, dry weather. The hardening of the pasture is not easy to describe, but can usually be detected. There is usually a darkening in the colour of the grass and it appears to become tougher. Precautions should not be relaxed until at least 24 hours after the pasture appears to be safe. It must be realised that pasture may become dangerous several times in one autumn and precautions must be repeated as often as appears necessary.

Experience has shown that it is not possible to tell with certainty when facial eczema will occur. If the advice given is strictly followed, stock will be protected against facial eczema, but precautions will sometimes be taken when no facial eczema occurs in free-grazing stock. At present there is no way of avoiding this without running considerable risks. Every effort is being made to isolate the liver-damaging substance in dangerous grass; when this has been done it will be possible to determine its concentration in grass at any time and this should make it possible to forecast dangerous periods much more accurately.

Experience with Prevention Methods at Ruakura

The methods recommended in this article for preventing facial eczema have been used at the Ruakura Animal Research Station during the last 12 years with the following results:—

In 5 of these years it was not considered necessary to take any precautions. In each of the remaining 7 years precautions were taken, but on each occasion some test sheep were allowed to graze freely to determine whether the pasture was really dangerous. During 3 of the 7 potentially dangerous seasons no facial eczema occurred either in the test sheep or in the main flocks. Thus on approximately half the occasions the precautions were needless. On the other hand, during the remaining 4 seasons at least some test sheep contracted facial eczema, but it was prevented in the main flocks in which the recommended precautionary measures were taken. Over these periods 2000 to 3000 sheep were run on Ruakura each year in 5 to 8 separate flocks on separate, self-contained farms.

In 1955 precautions were taken on three separate occasions; on 5 days in February after 1.5in. of rain, 8 days in March after 1.3in. of rain, and 6 days in April after ½in. of rain. The following precautions were taken: Flock 1 (400 ewes), Flock 2 (300 ewes), Flock 3 (300 ewes), and Flock 4 (200 ewes) were all shut up at the rate of 200 per acre. The only cases of facial eczema in any of these flocks were two which occurred in Flock 1 after the third danger period. After the second danger period the 300 ewes in Flock 2 were killed, and examination showed that no damage had occurred in any of their livers. Flock 5 (120 ewes) was shut up at the rate of 65 per acre. Six cases occurred in this flock during the first two danger periods and a further 3 cases during the third danger period.

During the first two danger periods 240 hoggets were confined to a crop of chou moellier. As the crop was finished when rain fell in April, they were shut up during the third period, except for 88 which were used as test animals. No cases occurred in the hoggets while they were on chou moellier or when they were shut up. When the 88 test hoggets were slaughtered 60 per cent. of them were found to have severely damaged livers and 25 per cent. were badly jaundiced.

Thirty-six 2-tooth wethers which had been allowed to graze freely showed 30 per cent. of damaged livers when they were slaughtered in May. It is thus obvious that Ruakura pastures were dangerous when precautionary measures were taken, and that when these were properly applied they were very successful.

The lower stocking rate of 65 per acre did not give complete control, though the incidence of facial eczema was low. An explanation for the 2 cases in the 400 ewe flock after April is necessary. The April rain at Ruakura began on the 17th, when ¼in. fell. The temperatures on that day and for several days previously had been extremely low, so that precautions were not considered necessary. A rise of 12 degrees in the minimum grass temperature, 4 degrees in the soil temperature, and 16 degrees in the minimum air temperature occurred on 18 April and conditions became extremely humid. Conditions looked dangerous again and sheep were shut up on 20 April; this was apparently a little late for complete control in one of the flocks.

Experience at Ruakura over the past 12 years thus indicates that if recommended precautions are

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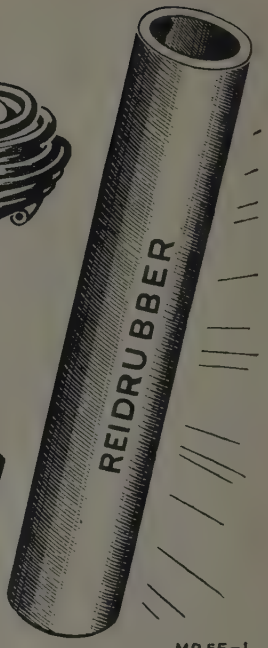

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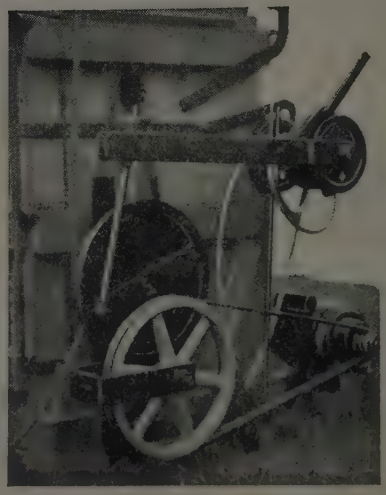

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applied thoroughly whenever they appear necessary, almost complete protection can be obtained against facial eczema.

Precautions will probably be taken approximately twice as often as facial eczema actually occurs. This is regrettable, but is surely better than permitting even one bad outbreak of facial eczema.

Can Facial Eczema Be Cured?

No drug is known which is likely to have any effect on the liver damage which occurs in facial eczema. In severe cases many of the smaller bile ducts are destroyed, the walls of the larger ducts become thickened and their bore is greatly increased, much of the liver tissue is destroyed, and the whole organ becomes fibrous and distorted. No treatment could possibly restore such a liver to normal. Less severely damaged livers recover without treatment sufficiently to function normally, provided no more toxic grass is eaten.

The skin lesions recover without treatment if the affected animals are placed in the shade. Veterinary treatment may sometimes hasten the recovery of skin lesions, and this may be worth while for valuable animals. Cows with facial eczema affecting the udder should be dried off at once, as if this is not done a very severe form of mastitis may occur.

What Should Be Done When Facial Eczema Occurs?

Animals affected by facial eczema should always be placed in the shade; if this is done as soon as the ears become swollen, swellings will subside quickly and no scabbing will occur. Usually by the time outward symptoms appear the pasture has become safe, but if a further dangerous period occurs, precautions already outlined should be taken with both affected and non-affected animals.

The disposal of affected sheep calls for considerable judgment. Sheep which lose condition very rapidly, even if they show no skin lesions, may not recover and are probably best slaughtered. Generally, however, a conservative policy pays. If sheep are given ample shade until skin lesions heal and they are not allowed to eat any more toxic pasture, most of them will recover condition. Even if they do not lamb, they will grow a fleece and become fat enough to kill in the following summer. The value of wool and carcass will greatly exceed the salvage price which can be obtained by sacrificing them in the acute stage of the disease.

Ewes which lamb after an attack of facial eczema should be watched carefully; those which lose condition after lambing should be culled. They can sometimes be fattened if the lamb is weaned, and they should then be sent to the works, as a further lambing would be a poor risk. Ewes which lamb normally, without losing condition, can be kept, as their livers are obviously functioning effectively.

As already indicated, dairy cows should be dried off as soon as their udders become affected. They, too, should be provided with ample shade and should be prevented from eating any further dangerous pasture. If affected cows are in calf, they should be kept until calving, unless they lose condition badly before this. Many cows have milked satisfactorily for several seasons after recovering from an attack of facial eczema.

Intensive research work on facial eczema has been conducted since 1938.

This work will continue until the liver-damaging factor is isolated. It should then be possible to say definitely which plants can become dangerous and so indicate more accurately when this is likely to happen. It may be possible to provide pastures which will remain safe during dangerous autumns.

In the meantime farmers can avoid serious losses from facial eczema if they plan intelligently and act incisively to prevent sheep and cattle from eating pastures which contain the liver-damaging substance which causes this disease.

Plans of Farm Bridges

By H. W. T. EGGERS,
Engineer, Department of Agriculture, Wellington

WELL-CONSTRUCTED bridges which will ensure access to all parts of the farm are essential to the efficient operation of watered farm properties. Plans of bridges and information on different types for different spans are available from the Department of Agriculture.

BRIDGE design and construction, like any other design and construction involving the strength of materials, is a problem which can be approached only by those having a knowledge of the forces involved and the strength of the materials it is proposed to use. To approach such problems without this knowledge is dangerous in that it may result in loss of life or limb and considerable material loss.

The farmer can, however, provide within reason the bridges he requires if he receives from engineers information that will enable him to choose the materials he needs to provide satisfactory bridges for the spans he requires. The farmer need not concern himself with problems of design, provided he is assured that materials specified for fixed loads and spans will carry those loads safely.

Range of Spans

Ministry of Works engineers have prepared plans for single-span stringer bridge construction using either timber or rolled steel joist stringers. The dimensions and numbers of stringers required for spans of 6ft., 8ft., 10ft., 15ft., 20ft., 25ft., and 30ft. are given in table form for 8ft. and 12ft. width roadways. Full details are given of reinforced concrete abutments, decking, handrails, and all auxiliary equipment required for the complete construction of the bridges. Schedules of material quantities are also available.

All bridges must be designed for specified loadings, and a total loaded weight of 6 tons is the maximum safe working load for which the spans are designed. If this loading is exceeded, the strength of the bridges cannot be guaranteed.

Special design is necessary for bridges requiring spans of over 30ft. and farmers should not contemplate building them without first having proper plans and specifications prepared by a competent person, preferably a registered engineer. Any plans and specifications for bridges must be closely adhered to during construction if the conditions of design are to be fulfilled.

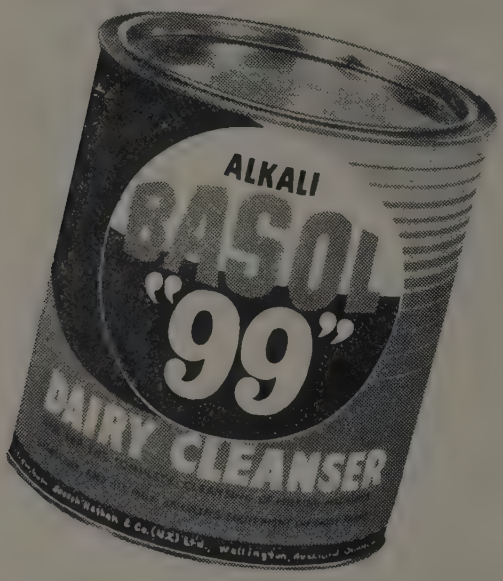
Alternatively spans up to 200ft. may be catered for by the use of all-steel truss bridges built from prefabricated parts. These bridges are provided in standard sections numbers of which can be added together to give various spans. They are supplied at a fixed price per ton, which includes all steel work and bolts and nuts for fastening, but does not in some cases include decking.

There is a farm version of these bridges suitable for a 12-ton loading.

Culverts

For bridging a very short span the use of a culvert may be more economical than a bridge. Reinforced concrete pipes are available up to 6ft. in diameter and these, if bedded correctly, make very satisfactory culverts.

Plans for bridges using either timber or rolled steel joist stringers can be obtained direct from the Engineer, Department of Agriculture, Box 2298, Wellington—inquirers must state for which type of stringer (timber or steel) the plans are required—or from the Machinery Instructor, Department of Agriculture, Auckland, Palmerston North, Christchurch, or Dunedin.



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New Issue of Sheep Dipping Bulletin

THE Department of Agriculture has recently reprinted, with the latest information on dipping equipment, Bulletin No. 181, "Practical Points in Sheep Dipping".

In New Zealand the troublesome varieties of external parasites of sheep are fortunately few and consist of two species of lice—the biting louse and the sucking louse—and the sheep ked, often erroneously referred to as the sheep "tick". The bulletin includes detailed descriptions and illustrations to aid in the identification of these parasites and has extensive sections on dipping materials and their effect on the pests.

The correct and wrong ways of dipping are emphasised and advice is included on the best methods of dipping lambs and valuable stud animals. Various types of dipping baths and methods of construction are comprehensively described and the numerous illustrations include detailed diagrams of baths designed for flocks of different sizes.

The bulletin is free and can be obtained from all offices of the Department of Agriculture.

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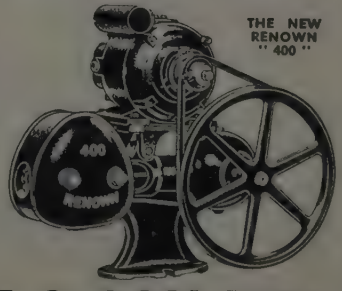

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Cheaper and More Permanent Fencing

By G. S. WILSON,

Massey Agricultural College, Palmerston North

THERE is no need to stress to farmers, particularly those in hill country, the increasing need for subdivision fencing. During the recent war and afterward existing fences fell into disrepair through lack of labour and materials. This condition has persisted to some extent through the post-war years.

THE adoption of aerial topdressing and oversowing of hill country, now tried and proved and rapidly gaining in efficiency and popularity, has further complicated the problem of fencing by emphasising the need for further subdivision to enable efficient management of the resultant improved pastures. But lack of timber and the steadily mounting costs of all fencing materials, labour, and transport have made it impossible to meet the need for more fencing by following orthodox fencing practices.

If by departure from the orthodox methods practised today fencing can be carried out as efficiently and much more cheaply, with the use of only the most durable materials above and below ground, the sooner knowledge of the new methods becomes widespread the better. In the first place only long-lasting materials should be used. The type of fence that has been accepted for generations is too costly to erect today and will incur a further enormous bill for depreciation over any long period.

Replacement costs for materials plus labour and transport over 50 or 60 years might perhaps add £400 to £500 per mile **for battens alone**, and for posts a further £600 to £700. If more lasting (above and below ground) and lighter materials of equal efficiency can be employed at similar or less cost, heavy depreciation may be reduced considerably.

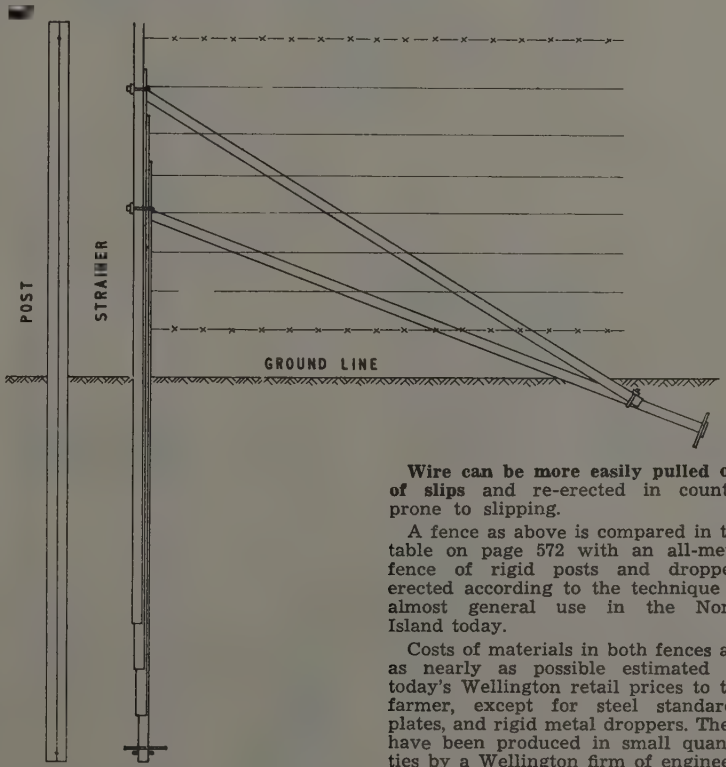
A good deal has been published hitherto in "The New Zealand Journal of Agriculture" on orthodox farm fencing. In the November 1950 issue a fencing technique known today as Hunter fencing, from its inventor Mr. C. Hunter of Waione, was dealt with.

Though the popularity of this new type of fencing is steadily increasing, the old style still predominates, despite its cost. Several hundred miles of Hunter fencing have already been erected, and its efficiency for containing both sheep and cattle has been amply proved.

Air Transport

Air transport of fencing materials was described in the July 1955 issue of the "Journal". A very successful drop was made in April in hill country near Porirua, and the practicability of an all-metal fence was demonstrated by the building of such a fence from materials dropped from the air. These materials had been adopted for lightness combined with strength and durability and at a reasonable estimated cost compared with timber.

The galvanised steel angle units for posts were ingeniously used for stays, angles, or strainers by twofold or fourfold lamination of the units, which were shackled together as shown in the diagram below. In addition



galvanised steel plate units served a dual purpose, for breasting or footing as required. This considerably lessened the problem of dropping from the air each unit of the fence just where it was needed on the line.

Investigation of the type of all-metal fence demonstrated at these airborne fencing trials and successful experiments with Hunter fencing make it apparent that a combination of the two would provide an excellent fence: a minimum of galvanised steel units and galvanised steel footing plates combined with Hunter chain droppers and Hunter tie-down footing devices.

The following are some of its main advantages:—

Comparative cheapness (probably 40 per cent. cheaper than an orthodox timber fence).

Minimum bulk and weight of materials and less subject to damage from air drop.

Tightness combined with resilience (ability to absorb shock from stock).

Longer-lasting materials, entailing minimum maintenance and depreciation.

Minimum resistance to wind or snow.

Wire can be more easily pulled out of slips and re-erected in country prone to slipping.

A fence as above is compared in the table on page 572 with an all-metal fence of rigid posts and droppers erected according to the technique in almost general use in the North Island today.

Costs of materials in both fences are as nearly as possible estimated on today's Wellington retail prices to the farmer, except for steel standards, plates, and rigid metal droppers. These have been produced in small quantities by a Wellington firm of engineers for trial use, and the cost of wholesale production can only be estimated approximately. Retailers would add perhaps 20 per cent. to the wholesale cost for distribution.

Hunter-type Fence

Following is a description of components of the Hunter-type fence and their method of erection:—

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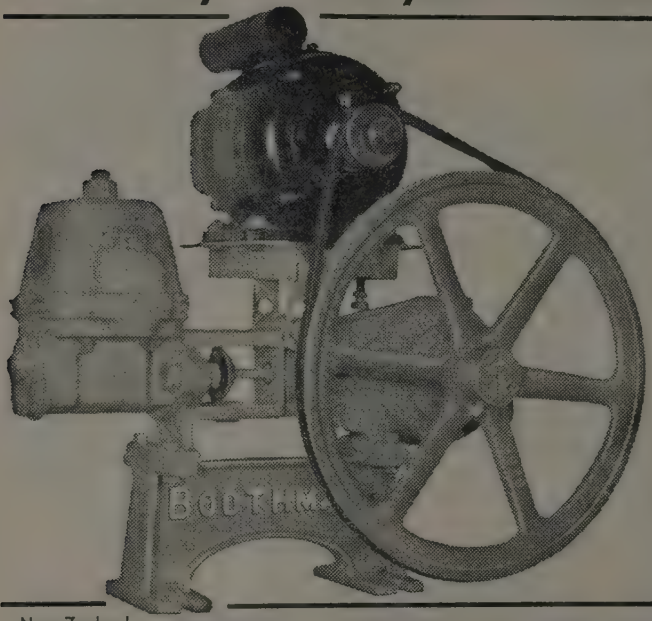

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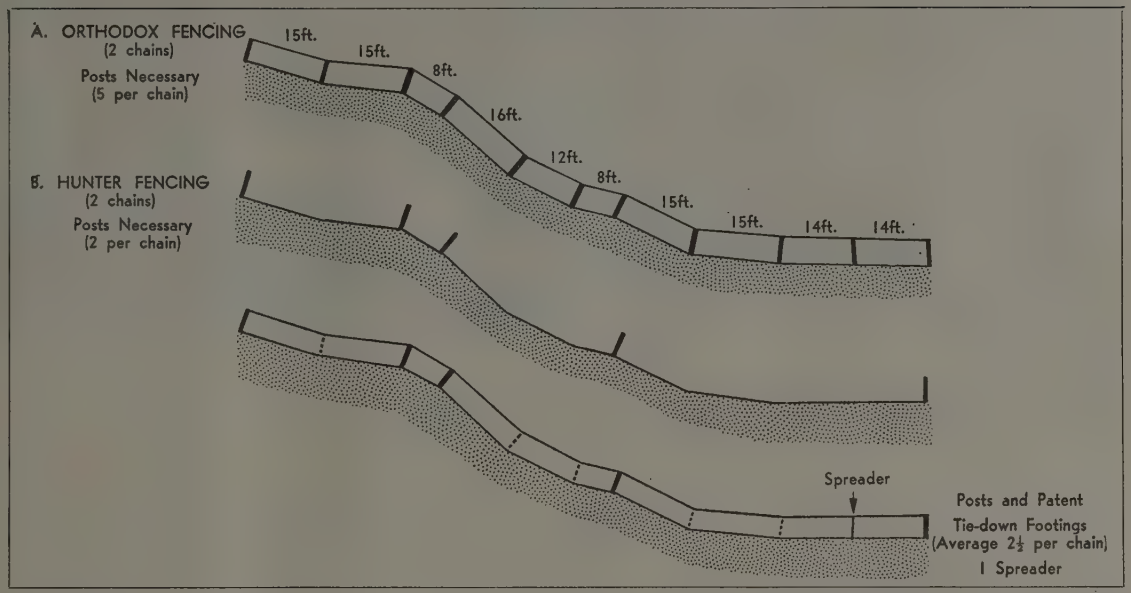
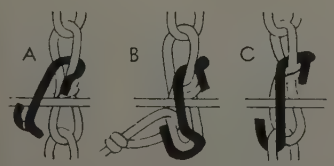
CHEAPER AND MORE PERMANENT FENCING



1. Chain droppers: The use of these is probably the most unorthodox feature of the fence. They contribute to give it resilience or ability to absorb shock. Made of 12-gauge galvanised chain (bought in 500ft. coils) they can be cut to the required length for droppers at home or on the fenceline with a snip of the wire cutters. They are spaced approximately 3ft. apart in the fence. Patent fasteners, quickly and easily attached, keep the droppers in position and allow the wires to run freely through, making re-straining easy (see below).



A—The patent fastener is hooked into the chain as shown and passed over the fence wire. B—The next link of the chain is raised so that the lower end of the fastener can be hooked in. C—Shows how the fence wire is clipped securely to the chain.

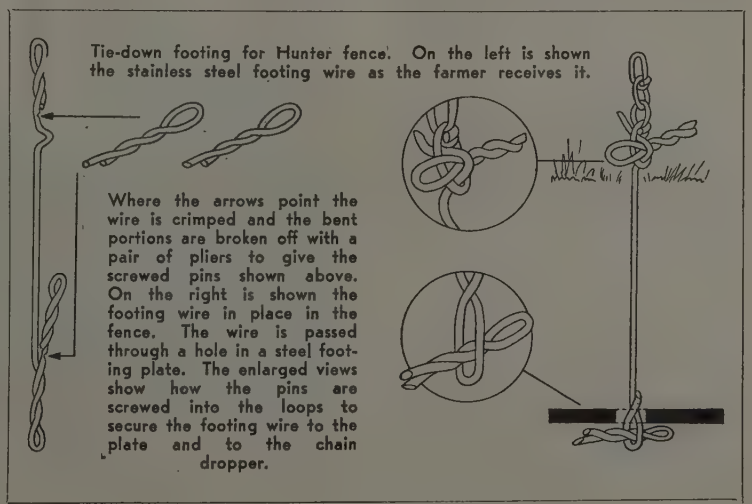
2. Posts: 2 to 2½ rigid posts per chain are needed against 4 or 5 in the orthodox hill country fence. Made of galvanised right-angled steel 6ft. 6in. x 1¾in. x 1¾in. x 3/16in., they are very strong and weigh only about 14lb. (about ⅓ or ¼ the weight of a timber post). The diagram at the top of this page shows the probable economy in posts on a typical 2-chain section of fence erected in hill country in the Hunter style, compared with an orthodox fence over a similar contour.

3. Spreaders: Where the interval between posts exceeds, say, 24ft. an intermediate rigid metal spreader can be used. It rests on the ground to support sag in the wires from horses or cattle reaching over.

4. Tie-down footing is a galvanised steel 3/16in. plating unit as for breasting. It is buried in the ground to the required depth with a patented, non-corrosive, stainless steel 10-gauge cable attached by a loop through a hole in the plate. This cable is looped again just above ground to a length of 9-gauge galvanised chain (bought in 250ft. coils) which ties the wires down to the required gauge (see diagram below).

5. Breasting: Unless breasted, narrow steel posts will not stand up to lateral pressure and will be pushed out of line. The same galvanised 3/16in. plate with an L shaped slot to take the angle iron is used to breast a post.

6. Strainers: Four angle-steel post units laminated and shackled together make a strong strainer, the back unit being sunk to ordinary post length, and each succeeding lamination sunk


Tie-down footing for Hunter fence. On the left is shown the stainless steel footing wire as the farmer receives it.
Where the arrows point the wire is crimped and the bent portions are broken off with a pair of pliers to give the screwed pins shown above. On the right is shown the footing wire in place in the fence. The wire is passed through a hole in a steel footing plate. The enlarged views show how the pins are screwed into the loops to secure the footing wire to the plate and to the chain dropper.

CHEAPER AND MORE PERMANENT FENCING

COMPARISON OF COSTS FOR ERECTING ORTHODOX FENCE AND ALL-METAL FENCE

A = 1 mile orthodox technique: 8 strainers (composite); 5 steel posts per chain; droppers, 3ft. spacing; 7 No. 8 plain galvanised wires and 1 barbed.

B = 1 mile Hunter technique: 8 strainers (composite); 2 steel posts and 1 batten spreader per chain; droppers, 3ft. spacing; 6 No. 12 galvanised steel wires and 2 barbed.

*Materials	Estimated quantity		Estimated cost		Weight	
	A	B	A	B	A	B
			£ s. d.	£ s. d.	cwt.	cwt.
Galvanised steel standard units 6ft. 6in. x 1¾in. x 1¾in. x 3/16in. @ 13s. each	460	220	299 0 0	143 0 0	54	26
Galvanised steel plates for footing, breasting, etc. @ 2s. 3d. each	422	262	47 10 0	29 10 0	7½	5
9-gauge chain for fastening wires to posts, footing, etc. (850ft.) 3 2/5 coils @ £4 15s. each.	—	850ft.	—	16 3 0	—	1½
80 patent stainless steel footing wires @ 26s. 6d. per dozen	—	80	—	8 17 0	—	⅛
12-gauge galvanised chain for droppers and spreaders (5,250ft.) 10½ coils @ £5 17s. 6d. each	—	1,500	—	62 0 0	—	4
1,350 galvanised rigid droppers @ £6 per 100	1,350	—	81 0 0	—	13½	—
30 shackles for stays @ 2s. (estimated) each	30	30	3 0 0	3 0 0	⅛	⅛
80 galvanised spreaders (for longer spans between posts) @ £6 per 100 ..	—	80	—	4 16 0	—	1½
No. 8 galvanised wire @ £67 per ton	23cwt.	30yds.	77 1 0	4 0	23	—
No. 12 galvanised steel wire @ £80 per ton	—	7½cwt.	—	30 0 0	—	7½
Galvanised barbed wire @ £80 per ton	3½cwt.	7cwt.	14 0 0	28 0 0	3½	7
B patent stapling attachments for chain droppers (10 bags) @ 30s. per bag ..	—	1cwt.		15 0 0	—	1
A stapling attachments for standards (1cwt. No. 8 wire) @ £67 per ton ..	1cwt.	—	3 7 0	—	1	—
B patent stapling attachments for standards (2½ bags) @ £1 per bag	—	½cwt.	—	2 10 0	—	½
			524 18 0	343 0 0	103	55
Transport:						
Rail £4 10s. per ton (estimated)			23 0 0	12 8 0		
Road £1 per ton (estimated)			5 3 0	2 15 0		
Air £8 per ton (estimated)			41 4 0	22 0 0		
Erection of posts driven, and footings, strainers, etc., dug in (estimated)			180 0 0	140 0 0		
		Total	774 5 0	520 3 0		

* Galvanised standards, plates, and rigid droppers are quoted at manufacturer's (estimated) wholesale prices. Merchants' retail prices for distribution would add approximately 20 per cent. on to these materials, that is, approximately £90 to A and £40 to B. All other materials are at present Wellington retail prices.

approximately 6in. lower into the ground, thus giving a total length of 8ft. The strainer is footed with the usual steel footing plate and stayed in two places with single post units locked against the shackles as stays.

7. Angle posts: These are made from two angle-steel post units laminated together and footed and stayed in the same manner as the strainers.

8. Wire: 12-gauge galvanised high-tensile steel wire may be used for the 6 plain wires. It does a first-class job, keeps tighter than No. 8, and is very strong, giving spring and resilience to the fence. However, over a long period this wire may prove to be less rust resistant than the commonly used heavier and softer No. 8 wire. For ordinary stresses from cattle in hill country it has been proved efficient. It is suggested that 10-gauge high-tensile wire, if procurable, might have all the advantages of both the lighter and the heavier wire with none of their disadvantages, but at present practically none of this gauge is being imported.

Use of High-tensile Steel Wire

A certain amount of prejudice exists against use of high-tensile steel wire in a post and batten fence; mainly criticism is that the wire breaks on being re-strained wherever it has to be re-tied or wherever it has been kinked when stapled hard home to a batten.

In Hunter fencing steel wire is not open to such criticisms. First, there is no need to untie the wire. Lengths of 9-gauge chain are attached to each wire in the middle of the strain and any type of wire strainer takes up the slack link by link. Secondly, as the wires in a Hunter fence run freely through all posts and droppers there should be no risk of kinking the wire at any point.

Ordinary No. 8 wire can be used, but it will need constant re-straining, for it is essential to keep Hunter fencing tight. Its use will add approximately 10s. per chain to the cost of the fence.

Barbed wires are commonly used at top and bottom. They keep the droppers in place and discourage stock, particularly horses, from leaning over and lambs from squeezing under the wires, especially in the longer spans between posts. In such places, if plain wires only are used, it is necessary to anchor the bottom wire lightly to the ground at intervals. If a barbed wire is not used, droppers must be attached with a special patent locking fastener to prevent lateral slipping.

Timber is scarce and costly and is not durable enough to warrant its use in hill country fencing at ruling labour and transport costs. Concrete is too heavy and too brittle for steep hill country transport.

The unorthodox technique of Hunter fencing can be no more subject to criticism today than were the first wire fences, which began to supersede stone walls, palings, and rails about a century ago.

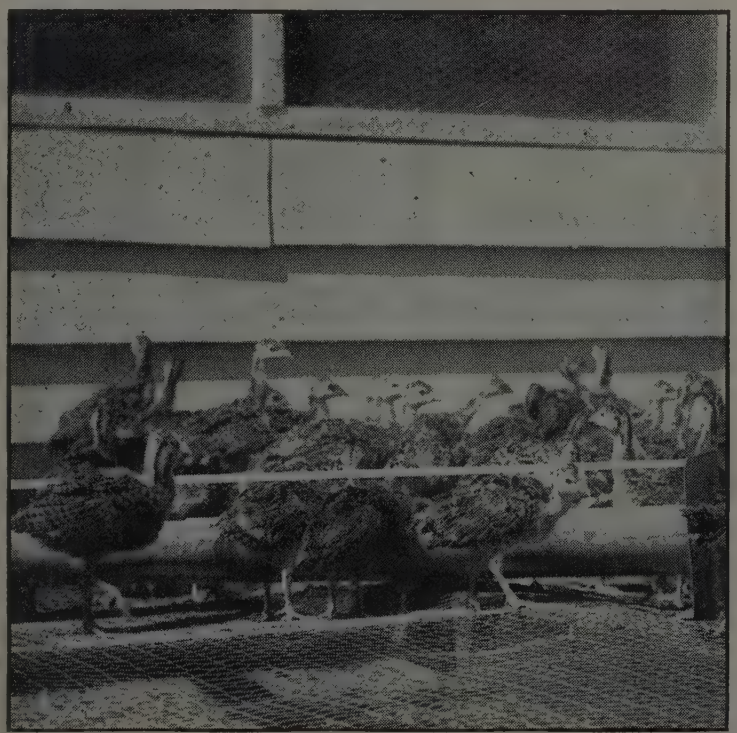
Since this article was compiled a questionnaire has been sent out to all known users of Hunter fencing materials. So far data for approximately 130 miles of fencing have been collected, and in all major respects reports have been strongly in favour of this technique for hill country. However, a number of farmers have criticised the quality of galvanising on the chain droppers. There is apparently a good deal of rusting already. This may be the result of second-grade galvanised wire having been used during periods of shortage, or it may be from strain on the wire going through the manufacturing machines.

Farmers should insist on first-quality galvanised chain. Redipping of the chain after manufacture may be the remedy. Representations have been made to the principal manufacturers and it is expected that the defect will be rectified quickly.

▲ Brooder house with outside sun-porches. Robertson photo.

Rearing Turkeys

IT is often remarked that turkeys are difficult to rear, but the management of young turkeys (poults) during the brooding period is today similar to, and no more difficult than, that of chickens. That poults must not be subjected to damp and cold draughts is true, but neither must young chickens. However, young turkeys are inclined to be shy eaters at the start and in this respect differ to some extent from day-old chicks. In this article, the third of a series on turkeys by the Animal Industry Division, details are given of the rearing of young turkeys.



[*Robertson*

Growing turkeys feeding in the sunporch of a brooder house. The wire netting floor is showing some signs of sagging. Slatted floors are stronger.

TURKEYS may be reared naturally with the use of turkey hens or hens or artificially by brooders. Natural rearing is suitable only where a few turkeys are raised and is not practised in commercial turkey production.

After Incubation

Day-old turkey poults should be transferred to their brooding quarters, whether natural or artificial, as soon as the hatch has been completed and the poults have been removed from the incubator. Poults can soon be affected adversely if they are kept from food and water for more than 24 hours after hatching. Consequently, if they are to be dispatched from the farm to buyers at a distance, they must be sent away promptly and by the quickest means of transport.

If ordinary chick boxes are used for transporting poults, the number of poults placed in a box should be at least one-third less than the normal chick capacity. Large boxes with a greater height than those used for chicks are desirable.

Natural Brooding

Where a turkey hen is used for brooding she may be given 20 to 25 poults. Generally, however, it is more convenient to use broody hens of some heavy breed and then each mother may be given 8 to 10 poults. Care must be taken to ensure that the hen used is freed of all lice before being given the poults.

The hen and poults should be housed in a well-constructed coop having an attached wire run. A suitable type of coop affording ample room for the hen and poults during bad weather should be of a lean-to type 4ft. long, 2½ft. wide, and 2½ft. high at the front falling to 2ft. at the back. This is a large coop and consequently comparatively costly, but it provides the protection so necessary for poults in the

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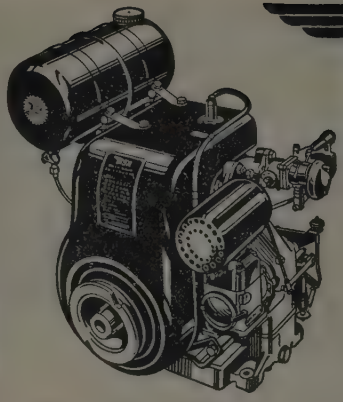

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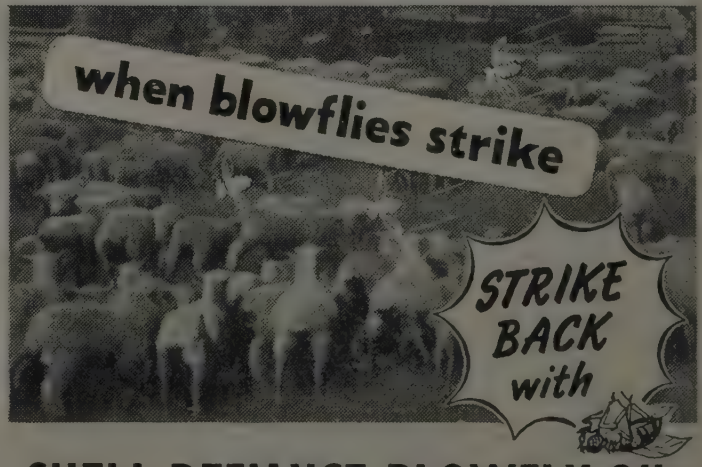

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Brooding turkey poults with an ordinary electric hover. In the early stages the run is limited by a surround, but later part of this is removed to give the poults more floor space.

early stages and such birds successfully brooded to 8 weeks of age are valuable.

A portable wire run 6ft. long and 1ft. high covered with small-mesh netting should be attached to the front of the coop to protect the young birds from vermin, cats, and other enemies and to prevent the poults from straying. If the young birds are allowed to run out on to grass in this wire run, the grass must be kept short and the coop and run should be moved daily to fresh ground. The ground used for the coop and run should be in a sheltered position and should not have been used previously for any kind of poultry, at least not for some years. Fine wire-mesh floors are sometimes used for these outside runs with the object of preventing birds from having direct contact with the soil to reduce the danger of disease.

Litter should be placed in the coop and removed regularly to maintain clean conditions. The hen should be fed twice daily with grain and the food for the poults placed out of her reach after the first 2 to 3 days, during which the hen will teach the young poults to feed.

Artificial Brooding

Two aspects of artificial brooding which must be considered are the type of brooder house and the brooding equipment. Both may be similar to those used for chick rearing. However, rearing of poults intensively with the aid of "sunporches" similar to those shown in the illustration at the top of page 573 is recommended. An orthodox multiple pen brooder house normally used for chickens is suitable for turkey poults. A square foot of floor space per poult should be provided and is adequate for birds up to 8 weeks of age.

The brooder house should provide ample light and good ventilation. The house should face north, but in districts in the North Island where the weather becomes hot during October to December it may be desirable to site the house north-east to avoid some of the hot summer sun from midday onward. Where sunporches are not used and poults are kept in the brooder house beyond 8 weeks, for example, to 12 weeks, 1½ sq. ft. per bird should be provided.

The sunporch may have a stout wire netting floor or be made of slats. If it is raised off the ground and a concrete floor is placed underneath, there is no difficulty in cleaning up the droppings from time to time. A sunporch may provide up to ½ sq. ft. per bird of floor space. Thus 1 sq. ft. in the brooder house and ½ sq. ft. in the sunporch will take care of poults up to 12 weeks of age. If netting is used in the sunporch, it should be ¾in. to 1in. mesh and of a heavy gauge. Where available, and if the turkey raiser is prepared to face a heavy initial cost, interwoven 1in. and 10-gauge wire flooring is strong and durable. The sides of the sunporch can have an 8in. board at the bottom with 3ft. netting on top. Boards to a greater height than 8in. may be placed at the ends or sides of sunporches if added protection from wind is considered necessary.

Brooder Equipment

In New Zealand any of the efficient electric hovers used for chickens are suitable for poults. Each bird should be allowed 12 sq. in. of hover space. Thus a 3ft. 6in. diameter hover will accommodate up to 100 poults for the 4 to 5 weeks they require heat. The period for supplying heat will depend on the weather and the time in the breeding season when the poults are being reared. Dull emitter infra-red units may be used for brooding. With battery brooders, which are also

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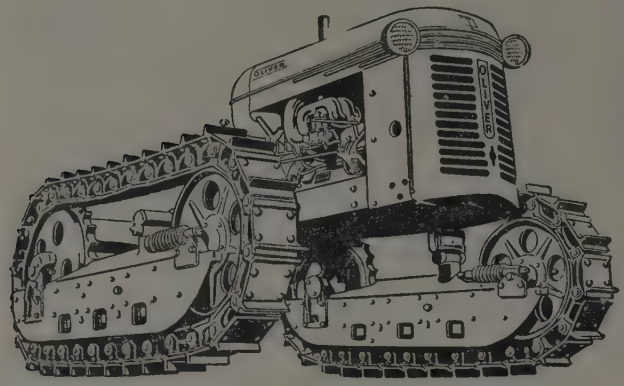

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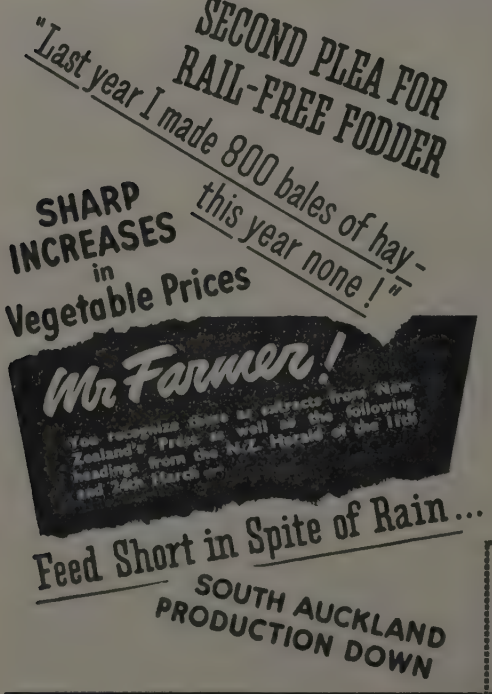
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Brooding turkeys in a movable fold unit brooder. The birds go on to fresh ground daily. This method is sometimes used in the United Kingdom.

used for turkeys, approximately 1/3 sq. ft. per bird of total cage space should be allowed. Poults should not be retained in battery brooders for more than 2 to 3 weeks, preferably for 2 weeks.

In floor brooding it is probably an advantage to use wire frames under the brooder of a type similar to those used for chickens. These should be covered with hessian for about a week or be packed tightly underneath with litter (chopped straw) for the same period. This tends to conserve the heat during the first few days and prevents the young poults from catching their hocks in the ½in. netting. Use of metal or wooden surrounds for the first few days is desirable to prevent poults from wandering away from the hover. These surrounds also prevent any undesirable ground draughts from striking the poults under and round the hover.

Generally the young birds will indicate whether the temperature under the hover is satisfactory. If it is too low, birds will tend to crowd under the hover; they should spread out comfortably round the perimeter. As a guide, however, a check should be made before the poults are put under the hover to see that a temperature of 95 degrees F. is registered just under the edge of the hover.

Ample watering and feeding space is a first essential in the successful rearing of poults. For the first week ½in. of watering space per poult should be allowed and thereafter ¼in. When dry mash is fed 1in. of hopper space per bird should be provided. Lack of hopper feeding room will result in retarded growth and poor feathering.

Feeding during Brooder Stage

In turkey production the main object is to obtain well-grown and well-fleshed birds which reach killing stage as early as possible compatible with the breed used. Thus an efficient ration from the start is necessary. The best results are obtained when a high level of protein is used, particularly during the first 8 weeks. The vitamin A and D content of the ration must be made approximately double that considered satisfactory for chickens and the fibre content of a mash fed at the start should be low.

Poults during the first 8 weeks are commonly fed mash only. There seems to be no advantage in feeding grain at this stage. Some coloured marbles placed on the mash in troughs have been found to attract the young birds when difficulty is experienced in getting them to start to eat. They peck at the marbles and then start on the mash. Some American turkey raisers report that a few day-old chicks put in with the turkey poults will induce the latter to eat, as the young chickens feed readily, thus setting an example for the turkeys.

The following mashes are recommended for the first 8 weeks:—

	lb.		lb.
Bran	10	Bran	15
Pollard ..	18	Wheat meal ..	22
Wheat meal ..	24	Ground oats ..	10
Maize meal ..	15	Maize meal ..	15
*Meat meal ..	20	Lucerne meal .	5
Milk powder ..	10	*Meat meal ..	20
Ground limestone ..	1	Milk powder ..	10
Bone flour ..	1½	Bone flour ..	1½
Common salt .	½	Ground limestone ..	1
	100	Common salt .	½
			100

* 58 to 60 per cent. protein.

To both of the mashes given should be added either 1½ pints of a fish oil containing 1000 units of vitamin A and 100 units of vitamin D or ¾ pint of a fish oil containing 2000 units of vitamin A and 200 units of vitamin D. The inclusion of 4oz. of manganese sulphate per ton of mash is also advisable. This small quantity can be incorporated in the mash most easily by first mixing it in with the salt.

The first mash given contains no lucerne meal and if this mixture is used, birds must receive an adequate daily feed of greenfeed such as fresh lawn clippings, finely chopped silver beet, or any other young succulent greenfeed normally used for chickens.

With the second mash, which includes lucerne, daily supplies of fresh green food are not as necessary, provided a really good lucerne meal is used. Many turkey raisers, however, prefer to feed adequate amounts of greenfeed daily during the brooding stage, as from experience they are convinced that young turkeys thrive better when fresh greenfeed is given.

Feeding after Brooding Stage

The first point to be decided after the brooding stage is whether growing turkeys are to be run intensively or on free range. The deciding factor will be whether the turkey raiser has adequate clean ground over which to range the young poults.

Turkeys are subject to a disease known as blackhead, which can be controlled by drugs, but is best prevented by sound management. Where fresh, clean grassland or lucerne can be used for ranging turkeys without any fear of overcrowding little trouble

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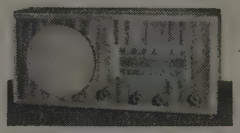

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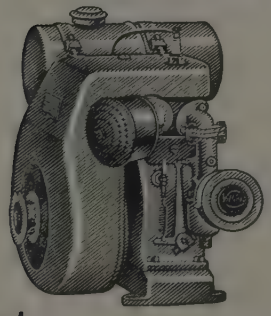

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from blackhead is likely. On the other hand, inadequate land which has been used previously for raising turkeys may soon become contaminated. Unless sufficient range is available, turkeys are better confined intensively in good housing with sunporches. Under such conditions the risk of blackhead is again reduced considerably.

Poults on Free Range

Where poults are run on free range after the brooder house stage they must be given some protection against cold winds and sudden falls of heavy rain. This protection can be given by portable lean-to shelters containing plenty of perching space (approximately 12in. per bird). These shelters are only a tier of perches protected at two sides and the back with a lean-to roof and built on skids so that they can be moved on to fresh ground as required. Generally such shelters are used for only a limited time—only as long as it takes to harden off the birds completely from the time they leave the brooder house. Thereafter birds are usually allowed to roost on perches set up in the open as shown in the illustration on this page.

Where turkeys are raised on free range, land having a well-drained soil should be chosen and some low cover, such as a hedgerow or hurdles specially put up for the purpose, is desirable to shelter birds during windy weather. Turkeys are easily frightened at night and an unexpected, bright light or prowling dogs will often cause panic among them.

Raising Turkeys Intensively

Where insufficient ground is available to have birds on free range and consequently there will be a grave risk of contamination turkeys are best kept intensively until maturity. The type of house chosen will depend to some extent on the district and weather, but usually in New Zealand either a lean-to type of house completely open at the front with outside sunporches or a full-span roof house mainly open at the sides and front is suitable.

Perching space in the open-fronted house should be provided in the house and feeding and watering space in the sunporches. In the full-span roof house slatted floors are preferable to heavy-gauge wire netting floors. The wooden slats used for such a floor should be of 1in. x 1in. or 1¼in. x 1¼in. boards placed 1in. apart. There is much in favour of building a house of this type on sloping ground so that the sunporches can be built on piles well above ground level. This permits cleaning out under the sunporches, where a considerable quantity of droppings accumulates.

When a full-span roof house is used the whole floor can be made of slats, but these must be well above ground level to allow cleaning to be done.

Growing poults on free range with perches set on sloping ground for roosting at night.

In either type of house the perches should be low to prevent leg, foot, or breast injuries. Overcrowding should be avoided to prevent feather picking and cannibalism. The smaller breeds of turkeys are best for intensive housing, but the larger birds, such as the Mammoth Bronze, can be handled successfully. Large-type turkeys should be allowed an average for both sexes of 6 sq. ft. per bird where reared to maturity in confinement. This figure applies to the house and sunporches where the latter are employed and to house floor space where no sunporches are used.

Feeding Growing Turkeys

After the brooder stage, when birds are 6 to 8 weeks old, two major changes in the rations are made. Birds from 8 weeks of age to maturity are fed grain and the protein level in the mash is lowered from 24 to 26 per cent. used in the starter mash to about 20 per cent. When grain is used with this mash the protein intake is lowered further, but should not fall below 16 per cent. The method of feeding most commonly practised in modern turkey raising is to place dry mash and grain in separate hoppers available to the birds at all times. Though wet mash is very palatable to turkeys, there appears to be no advantage in feeding mash in this form. Where turkeys receive a well-balanced and concentrated mash with grain no special fattening rations are required before they reach marketing size.

Birds on free range which have ready access to greenfeed need no lucerne meal in the mash. Where turkeys are maintained intensively the inclusion of a good lucerne meal is desirable.

The following mashes are recommended for birds from the time they are 8 weeks old until they are mature:—

	lb.		lb.
Bran	15	Bran	10
Pollard ..	22	Pollard ..	20
Wheat meal ..	25	Wheat meal ..	25
Maize meal ..	15	Maize meal ..	15
*Meat meal ..	20	Lucerne meal .	7
Ground limestone ..	1	*Meat meal ..	20
Bone flour ..	1½	Ground limestone ..	1
Common salt .	½	Bone flour ..	1½
	100	Common salt .	½
			100

* 60 per cent. protein.

Ground oats may replace part of the wheat meal and pollard where oats are available at an economic figure for feeding. Good oats (heavy) are an excellent food for turkeys. If meat and bone meal (45 to 50 per cent. protein) is used in place of meat meal (60 per cent. protein), the amount included should be increased by 2lb. to 3lb. and the bone flour omitted. Turkeys on good free range do not require vitamins A and D in fish oils.

With the mashes quoted a grain mixture consisting of wheat, maize, or barley may be fed with up to 50 per cent. of heavy oats. The following table provides a guide to food consumption up to 7 months of age:—

AVERAGE FOOD CONSUMED PER BIRD

	lb.		lb.
First month ..	1½	Fifth month ..	17½
Second month ..	6½	Sixth month ..	19
Third month ..	10	Seventh month .	24½
Fourth month .	14½		

This gives a total of 93¾lb. of all foods fed to maturity. Where growing turkeys are kept intensively care should be taken to supply hard grit for their gizzards as an aid to efficient digestion.

NEW ZEALAND MEAT ON THE UNITED KINGDOM MARKET

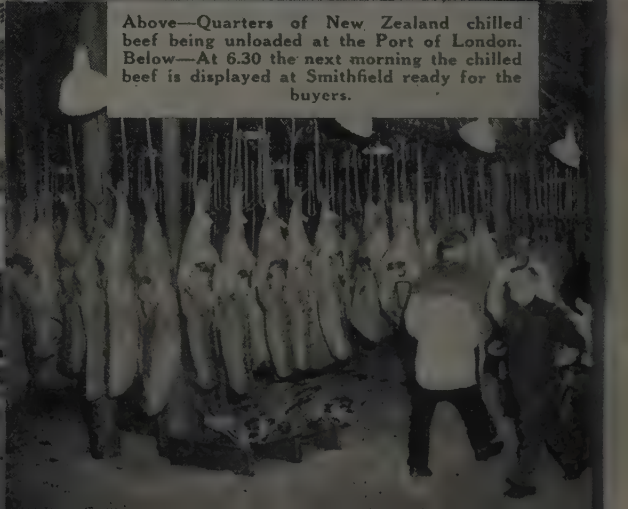
Above—An entry in the North Island lamb competition for 1954-55 being discussed by the chairman of the Meat Board, Mr. J. D. Ormond (pointing), Mr. J. W. de Gruchy, general manager of the Meat Board (left), and Mr. S. A. Chisholm, representative in Britain of the Meat Board.

In this year, the first year of free trading in meat since 1939, New Zealand will export about 240,000 quarters of chilled beef, all of which will go to the United Kingdom. Next year, if suitable shipping space is available, the volume of this class of meat may be over 400,000 quarters. The return to free trading and current overseas marketing trends are compelling New Zealand producer organisations to give closer study to the preferences and buying habits of the British housewife. Officials of producer bodies have been active in reviewing all the stages of transport, handling, and storage of produce and in reorganising these where necessary to meet the demands of the new phase of marketing. Reports indicate that in general the good name of New Zealand produce is being maintained. The New Zealand Meat Producers Board began an extensive advertising campaign in Britain which opened at the end of the bulk selling period. Quality competitions among consignments of New Zealand meat arriving on the London market are another way of helping to maintain quality.

Above—New Zealand chilled beef being unloaded from a locker of a vessel at London. Below—As dockers unload the sling a New Zealand Meat Board inspector notes the condition of the meat.

Above—The New Zealand High Commissioner in London, Mr. T. Clifton Webb (right), discussing the North Island lamb competition with Mr. Ormond (left) and Mr. R. Vestey.

Above—Quarters of New Zealand chilled beef being unloaded at the Port of London. Below—At 6.30 the next morning the chilled beef is displayed at Smithfield ready for the buyers.



Early Weaning on Fat Lamb and Hill Country Farms

Weaning should take place before most of the feed supplies have been unprofitably consumed by the ewe flock.

ON most sheep farms lambs are weaned more or less at a set date each year, irrespective of the season, the stocking rate, or the feed supply. In this article J. C. Gerring and J. D. J. Scott, Extension Officers at the Department of Agriculture's Ruakura Animal Research Station question the soundness of this practice and express the belief that in most seasons the weaning of lambs much earlier than is normally practised could well be the key to a much more efficient system of management on both fat lamb and hill country farms.

ONE of the characteristics of efficient grassland farming is the need to fit a variable but relatively inflexible feed supply to the more constant feed requirements of the grazing animals. In this respect sheep farmers in general and fat lamb farmers in particular are much more favourably placed than their dairying colleagues. Nevertheless, no farmer can afford to ignore any practice which enables him to increase the flexibility of his animals' feed requirements and to bring them more in keeping with seasonal fluctuations in pasture growth. It is primarily with this in mind that the practice of early weaning of lambs is discussed.

Feed and Needs

In an average season pasture growth has passed its peak by early December in most districts, yet the over-all feed requirements of the growing lambs and cattle continue to increase. Under such circumstances the ewes are actively competing with their lambs for available feed. The situation is eased on fat lamb farms by sending the first draft to the works. The lambs remaining, including most of the twins are not ready for picking, mainly because their growth-rate has already been limited by an insufficient supply of milk from the ewes. Is it necessary or desirable to leave those unpicked lambs with their mothers any longer, when by weaning and holding the ewes tight on a small portion of the farm much more feed could be made available to the lambs?

On hill country, where the feed situation cannot be eased by drafting, early weaning could be even more important.

Weaned lambs converting grass directly to meat, a much more profitable process than feeding it to them indirectly through the ewe in the form of milk.

Aspects to Consider

Before a policy of early weaning can be advocated a number of aspects need careful consideration. These are:—

1. Will early weaning enable more total feed to be grown?
2. Will the feed already available at this time of year be used more profitably by restricting the intake of the ewes and using the feed so saved for lambs, for cattle, and later for flushing the ewes before and during mating?
3. Will the weaned lambs do well without their mothers?
4. Will the deliberate reduction in the amount of feed allowed the ewes have any adverse effect on their subsequent breeding performance or on total wool growth and quality?
5. Will early weaning confer any advantages or impose any difficulties in the day-to-day handling of the flock or on the management policy generally?

More Feed Grown

Early weaning is the means by which a brake can be put on consumption of feed by ewes. If the weaned ewes are confined to a small proportion of the farm, excessive grazing of

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the majority of the paddocks before the onset of hot, dry weather is avoided. These paddocks are allowed to develop a cover of grass and continue growing into summer much longer than do bare ones. Consequently more total feed is grown.

More Profitable Use of Available Feed

The main reason for retaining lambs with their mothers until a late date arises from the belief that the ewes are contributing worthwhile amounts of milk to their offspring. However, recent studies by L. J. Lambourne, Research Officer, Ruakura, on the feed intake of free-grazing ewes during suckling indicate the increasing cost of producing this milk as lactation advances.

December milk production of ewes lambing in early August amounts to less than one-tenth of the total yield. Yet six times the amount of feed is required to produce it compared with that needed to produce the same quantity of milk at the peak of production, 3 or 4 weeks after lambing. These studies have shown, too, that 4 months after lambing a ewe is producing only about 1lb. of milk per day.

The production of this milk is very costly. In the first place a ewe at this time eats about three times as much feed as a lamb, and much of this feed is used merely to maintain her in her existing condition. Some of the remainder is used for milk production, but a substantial proportion is used to put on unnecessary weight. In the second place the lamb still has to convert what milk it receives into meat and considerable losses are involved in this process. The original grass thus has to pass through two animals, each of which first levies a toll on the feed before any of it is used for meat production.

On the other hand, in the direct turnover of grass to meat by the lamb the maintenance requirement of only one much smaller animal has to be met, and all feed surplus to this is used for growth. For these reasons the feed available will be used much more profitably directly by the lamb than if fed indirectly through the ewe in the form of milk. Obviously the employment of a milk producer any longer than necessary is a most expensive way of obtaining lamb meat. If lambs are weaned at 3½ to 4 months of age, the feed normally consumed by their mothers after that time can be used not only to sustain further lamb growth but to promote more rapid gains by cattle.

Though on an efficiently run fat lamb farm cattle are secondary to sheep, it is important to fatten and sell cattle at the earliest possible date. This can be done only if they are well fed throughout summer, which is a rare occurrence on a fully stocked farm practising late weaning. Some beasts may have to be carried for a further winter if they are inadequately fed in summer.

Ewes competing with their lambs for available feed and putting on unnecessary weight.

Feed surplus to the requirements of both lambs and cattle can be used to build up reserves for flushing the ewe flock later in the season.

Feed for Flushing

Dr. L. R. Wallace at Ruakura has shown that the practice of fully feeding sheep for 4 to 6 weeks just before and during the tupping season can increase the lambing percentage by 20 per cent. This is important if the maximum output of meat is the aim. Early weaning makes possible the provision of feed for this purpose. Indeed, in many districts flushing feed is very difficult to obtain in most years unless early weaning is practised.

Hill country lambs and cattle are quite often short of feed over summer and any extra feed is used by them to very good advantage. A feature of weaning 3½ to 4 months after lambing is the immediate easing of the feed supply. The chances of obtaining well-grown hoggets are then considerably enhanced and ultimately wintering difficulties are simplified.

Studies by E. A. Clarke on the Ruakura Hill Country Station have shown that well-grown hoggets clip considerably more wool and have, as 2-tooths, a much higher lambing percentage than poorly grown ones. An inadequate supply of feed in early summer is often a major cause of poor growth in hoggets, and early weaning does much to offset this.

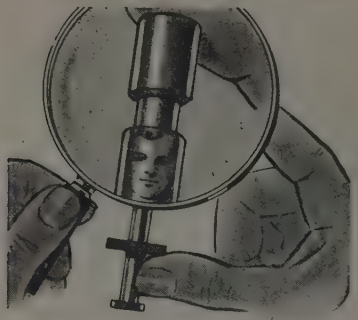
Thrift of Weaned Lambs

Feed saved in summer through early weaning of lambs can be put to good use, but to secure this feed the lambs' milk ration is cut out completely. If early weaning is to be successful, weaned lambs must do as well by themselves as they would do if left with their mothers.

On the Ruakura Hill Country Station this has been shown to be the case with Romney lambs. In three different seasons 12-week-old lambs were weaned on to spelled pastures and comparable groups were left with their mothers on good pastures for another 5 weeks. Both groups were very similar in liveweight and rate of growth and no real differences in fleece weights, worm burden, or general health could be detected between them. Similar trials will be carried out under fat lamb conditions, but the experiences of many farmers and the research findings at Ruakura already referred to indicate that much the same sort of results would be obtained on the lowlands as on the hills.

In most seasons the feed situation in December is usually such that ewes are competing with their lambs for available feed. Lambs start eating some grass at 2 weeks of age, and when 4 months old they rely almost entirely on it for growth. Denying them 1lb. of milk per day is more than compensated for by the extra feed made available to them by early weaning.

However, the growth-rate of lambs depends on the quality as well as the



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quantity of pasture offered to them, and in good seasons, when the lambs and cattle are unlikely to control pasture growth effectively on their own, weaning should be delayed. In such years the ewes play an important part in keeping the growth short and leafy for the lambs. High-quality pastures are essential if maximum lamb growth is to be obtained. In areas where first-class white and red clover pastures occur at this time of year early weaning may be done with complete confidence.

Effect of Feed Restriction on Ewes

Restricting the feed intake of ewes at any time undoubtedly depresses wool growth, but studies made by many different workers have shown that poor feeding has its greatest effect on fleece weight during late pregnancy. At Ruakura, over three consecutive seasons, Dr. Wallace contrasted the effect of different levels of feeding during the last 5 weeks of pregnancy on 5-year-old fat lamb breeding ewes. Ewes of the low-plane group were very heavily stocked so that they lost appreciably in actual body-weight before lambing. Even so they clipped only just over ½lb. less wool than the high-plane ewes, many of which were grossly fat.

This and other observations indicate that even moderately severe restrictions of feed intake during the non-pregnant dry period are unlikely to depress wool growth to an appreciable extent. After all, wool is a by-product of fat lamb production and any small loss will be compensated for manyfold by the extra returns from well-grown lambs, better cattle gains, and, even more important, a higher lambing percentage in flushed ewes.

On hill country the higher productivity of well-grown hoggets in both wool and subsequent fertility will recompense for any slight loss which may be incurred through early weaning of lambs.

Keeping the ewes in hard, thrifty condition from weaning to a few weeks before mating does not adversely affect their subsequent breeding performance. In fact the reverse is probably the case.

Management Advantages

Early weaning eliminates the complications associated with drafting and mismothering of ewes and lambs and keeping those ewes and lambs separated for minimum periods at shearing. More time can be spent culling ewes before they are shorn and early attention can be given to foot-rotting and dipping.

Separation of ewes and lambs on fat lamb country about early December allows fat ewes unwanted for breeding the following season to be dispatched to the works before the main fat lamb killing season.

Weed infestation on the hills is a major problem and paddocks unsuitable for grazing by ewes and lambs may be effectively dealt with by early weaned ewes sooner than usual and at a time likely to result in much better weed control. On properties where bidi-bidi is prevalent shorn ewes may be placed on infested areas and the lambs confined to clean pastures and shorn when desired. Early weaned ewes may also be used for pasture control work on fat lamb country. They may be used to trim down rough or weedy areas and allow a little fresh growth to come away before dry weather sets in.

Recommendations

The following recommendations can be made for fat lamb properties:—

1. Wean all the lambs when feed is becoming short. This very often coincides with the time the first draft is picked.

2. Wean the lambs on to paddocks containing a short, leafy bite. Clover-dominant pastures and the aftermath of hay crops provide excellent fattening feed for weaned lambs. Give them the choicest feed available.

3. Rotationally graze the early weaned ewes on a small proportion of the farm to save feed and prevent them from becoming excessively fat. If the ewes are allowed the run of the farm, the purpose of weaning early is defeated. Use the flock for any pasture-control operations.

4. Send fat cull ewes to the works as soon as possible.

The following recommendations can be made for hill country properties:—

1. Wean all lambs about 3½ months after lambing, particularly if there is a shortage of feed.

2. Place them on spelled paddocks when possible. Where the provision of such paddocks is difficult good results could be expected by removing the ewes from paddocks in which they have been running with their lambs.

3. Clean out rough and weedy paddocks with the ewe mob.

Conclusion

If maximum lamb growth, good weight gains by cattle, a high lambing percentage from flushed ewes, and satisfactory pasture and weed control are desired, on both fat lamb and hill country, weaning should take place before most of the feed supplies have been consumed by the ewe flock.

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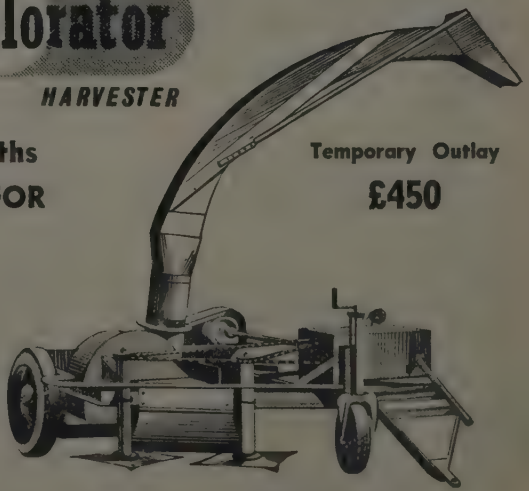

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Good Equipment and Methods Needed in Domestic Beekeeping

THE keeping of bees has, throughout the centuries, been an art of absorbing interest to many people. Others who would have found much pleasure and profit in the pursuit have been deterred by the fear of stinging. Today modern equipment and the proper application of modern methods have reduced the risk of painful stinging to a minimum. In this article D. Roberts, Apiary Instructor, Department of Agriculture, Auckland, discusses the use of equipment and management techniques which make the pleasures and interests of beekeeping possible to all except those hypersensitive to bee stings.

MANY beginners in beekeeping do not pursue the craft for more than a short time because, through lack of knowledge or insufficient protective equipment, they have suffered intensive stinging. Others have been advised by people who should know better that the use of protective clothing and equipment is infra dig. among knowledgeable beekeepers, and have paid for their credence with painful experience which has quickly terminated their interest in the keeping of bees. If the knowledge of the person giving such advice is judged by the condition of his own bees, it will frequently be found that his understanding of beekeeping techniques is very slight indeed.

Successful management of bee colonies is not easily achieved when the operator lacks confidence or is continually apprehensive of stinging. Despite assertions to the contrary, the penetration of the bee sting is always felt, no matter how much previous stinging has been experienced. In most cases the local irritation and rise in body temperature become less as the beekeeper gains experience, and in time some degree of immunity to the more serious effects of stinging is usually achieved.

Proper Protection

Experienced beekeepers, though they may treat a few stings on the hands or arms with casual disregard, do not invite stinging on the more sensitive parts of the body and take steps to see that they are adequately protected. Unless proper protection is provided, the beekeeper must expect to be stung, and beginners, particularly, should take all care to avoid stinging until they are sure that their reactions are not serious.

If stinging has serious effects accompanied by symptoms such as blotching of the skin and difficulty in breathing, a doctor should be summoned immediately. Persons displaying any tendency toward serious reaction after stinging should not persist in keeping bees.

The equipment necessary to ensure proper protection from stings is a good bee smoker, a well-fitting bee veil, a complete suit of clothing of other than woollen material, ankle-length boots, gloves, and a good hive tool.

Properly equipped in this manner the beekeeper can work in comfort and with freedom from stinging. Confidence will soon be acquired and the handling of the bees become pleasurable and interesting.

Bee Smoker

The bee smoker is a necessity in controlling bees. Though the smoker is of comparatively simple construction, the little care and attention needed to keep it functioning properly is amply repaid.

Smoke, if a reasonable amount is used, does not, as some people think, stupefy the bees, but acts on their inherited fear of forest fire and causes them to rush to cells of honey and gorge themselves in preparation for abandoning the hive. When thus gorged with honey or nectar they are much less likely to sting. A good volume of **cool** smoke is desirable at all times and to ensure this the smoker should be kept free from carbon and ash and only a slow-burning fuel should be used. Suitable fuels are old sacking, washed and thoroughly dried, wood shavings from a planing machine, or well-dried decayed wood. Whatever fuel is used it is advisable to make certain that it is well ignited and delivering a good volume of smoke before opening of the hive is attempted.

Properly cared for a smoker will last for years. Smokers should never be left outside in the weather, as the leather of the bellows will quickly deteriorate and crack if allowed to become wet. The grate at the bottom of the fire box should be kept clean and carbon and soot should not be allowed to accumulate in the lid and round the nozzle.

Complete recommended protective equipment of wire veil, gloves, boiler suit, boots, hive tool, and smoker.

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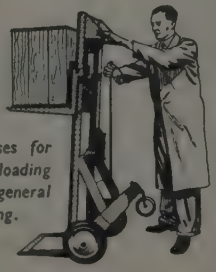

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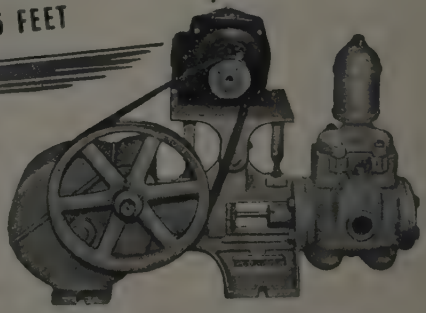

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When the smoker is being used the fuel should never be allowed to burn so fiercely that blue smoke, flame, or sparks appear at the nozzle. The secret of obtaining a good volume of cool, white smoke is slow burning. A very hot smoke, particularly if accompanied by sparks, will aggravate rather than control the bees.

Though plenty of cool smoke should be available at all times, some judgment must be exercised in application, because too great a volume is as bad as too little, and only sufficient should be given at a time to ensure control. Excessive smoking of a colony can nullify the desired effect.

Veil

A good, well-fitting veil is necessary if the face and head are to be properly protected. Veils are made of either cloth mesh material such as mosquito netting or fine wire gauze of the type used for fly screens. Cloth mesh veils are light and take up little room, but, unless they are provided with some form of framework, they will blow against the face in windy weather and allow the operator to be stung. Wire gauze veils are much more rigid and durable, and, if properly made, provide excellent vision and protection.

Whatever type of veil is used the part of the screen in front of the face should be dark if good vision is to be obtained. The front panel of a wire veil can be given a coat of non-glossy black or green paint, and cloth veils should be dyed black or dark green.

Clothing

The type of clothing worn for working among bees is important in avoiding undue stinging. Woollen or other clothing having a rough surface should not be worn. Cotton materials of white, khaki, or other light colours are most suitable. Clothing should always be clean and free from odour. White or khaki cotton overalls of the full or boiler suit type offer excellent protection and can be washed easily.

An accompanying illustration shows how the cuffs of the sleeves and trouser legs of full overalls can be fitted with buttons or snap clips to prevent entry of bees at these points. Clothing should be loose fitting, giving full freedom of movement, and in hot weather no more than is necessary for protection should be worn so that the operator will not perspire unduly.

Unless properly covered, the ankles are particularly liable to be stung when a beekeeper is working round the hives. Tucking the trousers into the socks or the use of bicycle clips or cuff fasteners will prevent the entry of bees at this point, but the ankles can still be stung unless boots are worn. Though thick woollen socks will offer some protection, they are not entirely satisfactory, as the wool attracts the bees and some stings will penetrate. Ankle-length boots worn with good-quality cotton socks offer the best protection.

Method of closing sleeves and trouser cuffs against entry of bees.

Alternative to standard bee gloves. Note the proper hive tool.

Gloves are a great help to beginners and should be worn until confidence and the ability to withstand a few stings are thoroughly established. Leather gloves fitted with elbow length gauntlets of canvas or heavy cotton material are obtainable from most suppliers of apiary equipment. If these are not obtainable, a pair of good rubber gloves, such as those sold for household purposes, and a pair of cloth armlets made with elastic at each end will provide good protection. A disadvantage with rubber is lack of ventilation, but rubber gloves give a better sense of touch than heavy leather ones and do not impede the handling of frames to the same extent.

Though various types of hive tool are in use, the standard type (see illustration above) is the best for general use. A proper tool will be found to simplify hive manipulations and is much more satisfactory in use than substitutes such as screw drivers or chisels.

Management in the Apiary

Proper protection is essential to comfortable working, but the weather during which the work is done and the manner of working are of equal importance. Bees respond to handling much more equably when the weather is favourable. Beginners should con-

fine their manipulations to warm, sunny days.

Unless it is unavoidable, bees should not be worked when cold squalls are frequent, immediately after rain, when thunder storms are in the vicinity, or when there has been a sudden cessation of a honey flow. In such conditions even the gentlest of bees will become irritated and difficult to manage. In early spring or late autumn, even though the weather is favourable, manipulations are best carried out between 9 a.m. and 3 p.m.

When a hive of bees is being opened movements should be gentle and slow and care should be taken to avoid any jarring or vibration. The hive should always be worked from the side. Working in front of the entrance interferes with the flight of bees to and from the colony and may cause the bees to become irritated and sting. The hive should be approached quietly and a few puffs of smoke placed in the entrance.

To give the smoke time to become effective the lid should not be lifted for at least a minute and then as gently as possible so that there is no jarring. If the lid is heavily stuck down with propolis, the colony should be given another puff or two of smoke and the lid levered off gently with the hive tool. When the lid has been removed a little more smoke should be puffed over the top of the hive and any inner cover removed quietly. At the same time smoke should be applied gently across the frames as they become exposed.

If the colony is of two or more supers, the top ones may have to be lifted off. Again, any separation should be done quietly so that there is no jerking or jarring of the colony. The supers lifted apart should be covered immediately with a spare lid or a clean sack. If the smoker has to be put down when a hive is being worked, it should always be stood upright. If it is laid sideways or allowed to fall in long grass, the fire may be extinguished and the smoker be useless when it is urgently required.

If the frames are tightly held down with propolis, they should be loosened in the hive by placing the point of the hive tool between each pair and gently levering sideways. The first comb to be removed should be the one nearest to the outer side of the hive. This will provide room to remove the remainder without crushing any bees. The combs should be removed with smooth movements and particular care taken to avoid crushing of any bees. Nothing is more likely to infuriate a colony than jerking frames loose and crushing or killing bees. Movements at all times should be smooth and steady.

When the hive is being examined a few puffs of smoke directed across the combs and any clusters of bees from time to time will keep the bees under control. If the bees become excited and fly out of the hive, showing every intention of stinging, the operator should not strike at them, but should try a little more smoke. If further smoke does not bring them under control, the colony should be quietly closed down and left until another day.

During examination of a frame of bees the frame should always be held over the hive. If the queen drops from the frame while it is being handled, she will then fall back into the hive and not on to the ground alongside, where she will most likely be lost and die. Combs taken from the hive for examination should always be returned in their original order.

The importance of easy, smooth movements and the avoidance of jarring and vibration to proper handling of bees cannot be overstressed and any extra time and effort involved in developing a good approach is amply repaid.

Though the intelligent use of good equipment and methods combined with favourable weather will ensure that little difficulty will generally be experienced, not all strains of bees will respond equally to control measures and some will be inclined to sting even in the most favourable circumstances.

Should the stock have been obtained by the taking of a wild swarm or purchase from a source where the strain of the bees is not good, the colony may be persistently savage and difficult to handle at all times. The remedy lies in requeening the colony with a queen of a gentle strain. Queens of strains bred for good handling and honey production can be obtained from commercial queen breeders for a few shillings each. This outlay is generally repaid many times over in convenience of handling and improved honey production.

Photographs by Sparrow.

Use of Fine-particle Phenothiazine

By L. K. WHITTEN,
Parasitologist, Department of Agriculture's Wallaceville Animal Research Station

THE toxic properties of phenothiazine for worms were discovered nearly 20 years ago, and since that time increasing amounts of the drug have been used in the treatment of worm infestations of farm animals.

Phenothiazine was soon recognised as being superior to older remedies both in the range of parasites against which it was effective and in its higher level of efficiency against many of the more harmful species. It was shown that its action was threefold in that it eliminated most of the infection with susceptible worms, the egg production of surviving worms was temporarily inhibited, and eggs that were passed failed to develop when small amounts of phenothiazine were present in the dung. It showed further advantages in that it was effective whether it was swallowed into the rumen (first stomach) or the abomasum (fourth stomach) and repeated small doses were sometimes as effective as a single large dose.

It soon became clear that the value of the drug varied widely against different parasites. It was highly effective against the large stomach worm (*Haemonchus*) and against certain large bowel parasites (*Chabertia* and *Oesophagostomum*), it was moderately effective but rather variable in its action against *Ostertagia*, *Trichostrongylus*, and hookworms, and it was virtually ineffective against *Cooperia*, *Nematodirus*, *Trichuris*, tapeworms, and flukes.

The results of recent research carried out in Australia and New Zealand show that the efficiency of the drug is influenced by the degree of fineness to which the material has been ground. It is still uncertain what degree of fineness will give maximum efficiency, but material with particles less than 10 microns in diameter gave better results than coarser fractions of the same batch of drug. Against *Trichostrongylus* the finer material showed up to greater advantage than against *Haemonchus*, as though the finer material gave slightly better results against *Haemonchus* than did the coarser fractions, the efficiency of the coarser material was still reasonably satisfactory.

There are certain disadvantages associated with the use of very finely ground phenothiazine. The extra processing required undoubtedly increases the production costs of the drug and the extra fineness introduces further difficulties in the formulation of liquid suspensions. Though no evidence has so far been obtained, it is possible that the small particle size may result in increased oxidation and absorption from the gastro-intestinal tract and consequently it may increase the risk of phenothiazine poisoning in susceptible animals such as horses and cattle.

Chou Moellier is Reliable Summer and Autumn Forage Crop

By G. S. ROBINSON,
Senior Lecturer in Soils and Field Husbandry,
Massey Agricultural College, Palmerston North

Large breaks are wasteful in the feeding of crops. Here the crop was cut in the foreground and carted off, but the cows turned into the remaining crop wasted about two-thirds of it.

THOUGH chou moellier is a crop that is less likely to fail than most other forage crops, there is no doubt that much could be done by the average grower to improve its present performance. With greater attention to details of sowing and early management the advantages of this crop are capable of greater exploitation in supplementing grass, not only for dairy cows but also for sheep and beef cattle. This article discusses some of the important practices associated with the successful growing of chou moellier for summer and autumn feeding in the North Island.

THE crop is now so well distributed throughout all districts in New Zealand that farmers have had ample opportunity of seeing it, and a detailed description of it is therefore not included here.

Suitable Soil and Seed-bed

The objective in cultivation is to produce a seed-bed that is fine, firm, moist, and weed free. This will be most easily obtained where the crop follows grass. Early ploughing leaves ample time for the turf to rot and a fine tilth to develop.

In the North Island generally there is no advantage in ploughing before spring, as land fallowed over winter becomes weedy and nitrogen loss occurs in high-rainfall districts. Poor drainage is often one of the main reasons for late seed-bed preparation. Wet areas should therefore be drained so that cultivation will not be held up in spring and sowing delayed much beyond the end of September. With early sowing the crop will be amply supplied with moisture and will have made considerable growth before dry weather slows it up.

Most farmers have a range of implements capable of reducing the soil to a fine enough condition, but what is often lacking is a roller, and the resulting poorly consolidated seed-beds are a very common cause of crop failure in the North Island, especially on coarse-textured soils such as in Taranaki and on others of volcanic origin.

Apart from the factors mentioned, the growth of the crop will be greatly influenced by soil fertility. This is normally satisfactory after pasture, especially where the grass has been down for many years and has been highly productive. Where the soil has carried a low-producing pasture weak in clovers it will grow a poor crop when ploughed. Nevertheless, the fact that a pasture is not ryegrass-white clover dominant does not necessarily mean that a poor crop will follow. Bad grazing management of the pasture might have been the cause of its deterioration, and the soil below it could be high enough in organic matter to grow a good crop.

Whatever the natural fertility, some boost can be given to it by concentrating the feeding out of hay and other supplements on to it in the months before ploughing. This is especially applicable to the North Island dairy farmer who can winter his dry cows on the paddock to be used for next year's cropping and to the sheep farmer who can use such a paddock as a run-off from his winter-fed crop. The effect of poor fertility is often seen where a second crop is grown on the same paddock. Such a crop is usually much poorer than the first, mainly because the fertility has been transferred either by the carting off of the first crop or by the stock removing it through on-and-off grazing. Where a second crop must be sown nitrogenous fertilisers may be worth a trial.

Method of Sowing

The method of sowing will depend on (a) the equipment available and (b) the prevalence of weeds. Where the soil is clean, as for instance after the first ploughing of an old pasture, it is immaterial whether the seed is sown through every coulter or in wide rows. Drilling is better than broadcasting, but only because fertiliser, especially phosphate, can be sown with the seed and thus placed in a good position for its ready utilisation.

When annual weed seeds are prevalent in the soil sowing in wide rows favours weed control by cultivation and may mean the difference between success and failure of the crop. At Massey Agricultural College such cultivation resulted in an increased yield of 10 tons of chou moellier per acre in comparison with adjacent broadcast uncultivated sowings. Two cultivations only were given, one with a hand cultivator as soon as the seedlings appeared in the rows and a second with a tractor cultivator when the crop was 6in. high—a very small outlay for the increase obtained. In addition, the crop being cleaner, there was a much reduced reinfestation of weed seeds. Frequent crop failures follow the broadcasting or close drilling of crops on really weedy soils.

The prospects of using weedkillers for economical control of weeds are brightening. Already reasonably satisfactory results have been obtained with the pre-emergence spraying of TCA for weed control in swedes, and though the effects of such spraying have been discouraging in some districts, there are indications that with further investigation the difficulty of weed control in crops such as chou moellier should be reduced.

The effect of row spacing on factors other than weed control has not been investigated, but a trial sown at Massey College this season should provide some information on its relationship to yield and leafiness.

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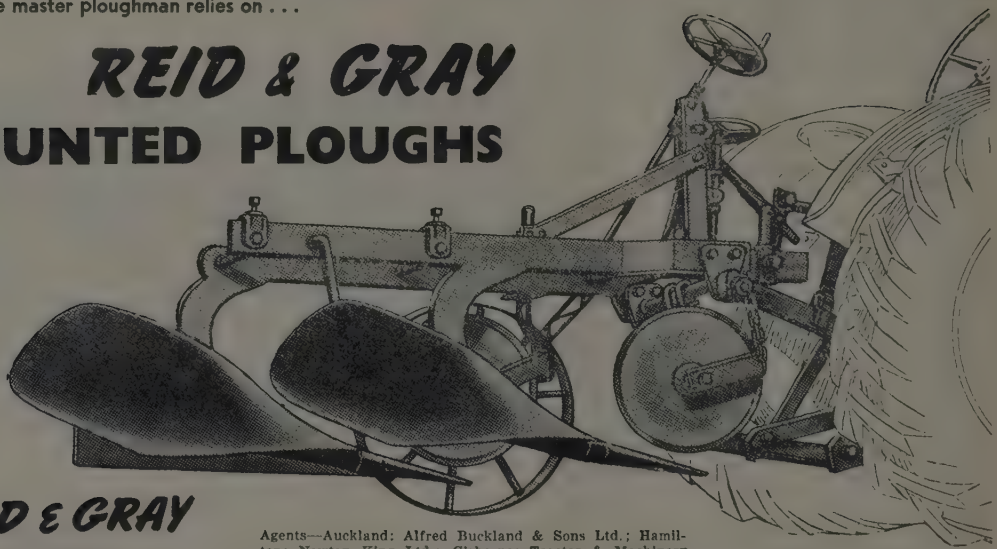

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Effect of Seeding Rate on Yield

Seed of kale and chou moellier is in short supply this year and is being rationed by merchants. Many farmers will be wondering whether a reduced allocation of seed should necessarily mean a reduced acreage of crop or whether a worthwhile crop can be grown with a lower seeding rate per acre. Three years' trials at Massey College have indicated that with crops sown in 28in. rows there was only a slight reduction in yield when seed rates were reduced from 2lb. or 3lb. per acre to as low as 1lb. per acre. There seems to be no reason why similar reductions in seeding rates should not apply to crops sown in narrow rows, or those broadcast, provided the seed being sown is known to be of satisfactory germination. That being so, little reduction in yield would occur if the seed rate was reduced by up to one-third. The main effect would be that fewer but bigger plants would result. Reducing the seed rate per acre is preferable to reducing the acreage sown.

Best Way to Feed Chou Moellier

For sheep chou moellier is almost invariably break fed. No doubt there would be less wastage if the crop were cut and fed out on pasture, but the labour involved more than cancels out the savings effected. The size of break in relation to the yield of the crop and the number of stock to be grazed will determine the extent of the wastage. In practice, however, breaks are made large enough to last at least a week because of the labour involved in more frequent fencing.

For summer feeding of dairy stock it has been found at Massey College that break feeding is wasteful. Even the best methods such as cutting a long, narrow break sufficient for one day and feeding it under an electric fence leave over 40 per cent. of the crop on the ground. Reducing the size of the break or leaving the herd on the break longer than an hour or two after milking results in a drop in milk production. Breaks large enough to last 3 or 4 days give a wastage of up to 70 per cent. of the crop, owing mainly to the trampling of the leaf into the ground. Little if any stem is eaten in such circumstances.

On the other hand, cutting and carting out the crop on to pasture for feeding result in practically all the leaf and stem being eaten, owing mainly to the stock returning later in the day and eating the residues left after their initial fill has been taken. This method demands time and labour, but will be economical during a period of feed shortage as in a drought year. During a good growing summer, however, pasture and crop together are usually more than ample, so the latter can then be used more economically of labour by break feeding despite the extra wastage that will occur. The method used, therefore, will depend on the season and the feed situation.

Establishment of Pasture after Crop

Where a summer crop of chou moellier is taken after pasture and utilised before the end of February the preparation of the ground for a new pasture can go ahead in good time, thus enabling it to be ready for sowing by the end of March. The land is out of grass for a very short time and can often be under grazing again 8 months after the original ploughing. Two considerations to take into account in deciding whether this is a satisfactory method of pasture renewal are:—

(a) Can a good physical soil condition be obtained after chou moellier?

(b) Is the fertility of the soil good enough for the best establishment of pasture?

(a) Chou moellier is often criticised on account of the residue of stems remaining after the crop has been eaten off and the effect that this has on the subsequent ploughing and seedbed preparation. The work can be made easier by chopping up the remaining stems with discs or a rotary cultivator before ploughing. Even so the harrows are certain to bring some of the very fibrous bases of the stems to the surface if the ploughing is not first class; but unless it is very bad—and then light harrowing only should be given—no serious effect will be seen in the subsequent pasture.

(b) Fertility embraces organic matter, nutrients, water supply, and tilth, but in the establishment of a young pasture after a successful crop the organic matter status is, perhaps, the main fertility factor that affects the results. The beneficial effect of the organic matter is due largely to the nitrogen it contains. With cropping there is always a decrease in organic matter content except where a forage crop is fed in situ with little or no run-off for stock. Extreme deficiency of organic matter will show itself in the new pasture being slow to establish and becoming clover-dominant for the first year or two.

On the other hand extremely high organic matter may make it difficult to establish the clovers because of the vigorous grass competition. The ideal lies somewhere between these two extremes. Cropping should be of value in exploiting high organic matter, but it should not be practised on soils low in organic matter because of its effect on later pasture establishment and because the crop itself will rarely be economical.

Where chou moellier is grown as a winter crop the succeeding pasture sowings either have to be made in spring or the land must be cropped a second time for the production of a summer crop. District experience will show which practice is better. A summer fallow may sometimes be the answer.

Feeding Value of Chou Moellier

The leaf of chou moellier is more nutritious than the stem and consequently should be in as high a proportion as possible. Stem growth is not only more watery, but is less digestible. Toward the bases the stems may become quite woody when mature. Young crops are leafy, but with age the stem increases in weight more rapidly than the leaf.

Though chou moellier is rated highly as a summer supplement for milking cows, feeding trials have been insufficient to enable a satisfactory comparison to be made with other crops normally used for this purpose. However, chou moellier is considered by farmers to be at least as good as soft turnips, and both are superior to maize. The feeding value of most crops is largely dependent on their stage of maturity, but chou moellier has an advantage in being able to retain its succulent condition over a long period. Crops like maize and millet deteriorate rather more if not used at the optimum stage of growth and soft turnips are liable to rot.

Chou moellier is very palatable and generally is considered superior in this respect to thousand-headed kale for summer feeding to dairy cows. The latter crop improves, however, as it matures, and the leafage of the two crops in winter is very similar in quality and palatability.

As fattening crops for sheep chou moellier and thousand-headed kale appear to be very similar, but neither of them is satisfactory in a district where summer rainfall keeps the crop growing vigorously during these months. Fattening ability seems to be associated with a slowing down in growth-rate and a hardening of the foliage already produced. This is somewhat akin to the "ripening" of rape. These crops have the advantage that they recover well from early grazing compared with most others. In some instances a crop used for summer fattening of lambs may later produce a full crop when shut up for winter.

There have been instances of digestive troubles after the use of second-growth chou moellier and where the crop starts to flower before being fed off in early spring. These troubles are, however, frequently associated with sudden changes of diet, which are always liable to cause upsets. The ability of the dairy cow to cope with large quantities of chou moellier, as long as it is introduced gradually, is instanced by the fact that during the summer drought of 1954-55 some Massey College milking cows ate nearly 200lb. of chou moellier per head per day without ill effect.

Early Weaning of Pigs Pays Handsome Dividends

By D. M. SMITH,

Pig Research Officer, Department of Agriculture Ruakura Animal Research Station, Hamilton

THE development of a practical technique for early weaning pigs is a major advance in pig husbandry. The system allows a drastic reduction in sow feed requirements and can result in a 33 per cent. increase in the efficiency of feed utilisation on the farm.

EARLY weaning consists of removal of the piglets from the sow at 7 to 10 days of age and hand rearing them on feeds prepared for that purpose.

The method of early weaning and hand rearing is as follows:—

1. Remove the piglets from the sow at any stage after 7 days of age. If the piglets are unduly small, leave them on the sow until they average 6lb. In overseas countries it is usual to remove the piglets within 24 hours of birth in order to reduce losses from overlaying. By use of the round farrowing houses, losses from this cause are negligible, hence removal at a week is recommended.

2. Place the piglets in warm, dry quarters and provide a heat lamp for at least a week after weaning (see the illustration above). If shavings or sawdust are to be used as bedding, do not place these in the pen until the litter has started to feed. Should the piglets start eating their bedding, it is more difficult to interest them in their proper feed.

3. Provide clean drinking water. A constant supply is essential.

The piglets should be placed in warm, dry quarters and a heat lamp used for at least a week after weaning.

4. At the start provide a small trough as in the illustration below. Fill this with meal or pellets mixed to the No. 1 recipe given.

5. Once the litter has started to feed enthusiastically, replace the small trough, preferably with a self feeder that will hold several weeks' supply of feed (see the illustration on page 595).

6. Apart from cleaning out the pen and replenishing the water no further particular attention need be given until the litter is 28 days old.

7. At this stage a mixture is made of meal or pellets of the No. 1 and No. 2 recipes given and this mixture is fed for the following week. At the same time the litter is given 1 pint of fresh separated milk per pig per day in three feeds.

8. At the end of the fifth week the No. 2 ration is fed alone and the separated milk increased as follows:—

▼ After the piglets are weaned a small trough filled with meal or pellets should be given.

Sixth week 2 pints, seventh week 4 pints, eighth week 8 pints, ninth week 1 gallon plus 1lb. meal.

9. From the end of the ninth week the litter is fed according to the Ruakura ration scale published in the July 1953 issue of the "Journal".

10. The litter is allowed out on pasture for about an hour two or three times each week over the 7-week rearing period. This is normally done while the pens are being cleaned out.

In most cases there is no difficulty in getting the newly weaned litter to take feed. However, some litters prove difficult and for these any one of the following methods will help to get the feeding process started:—

(a) The attendant should spend some time in the pen until the piglets start biting his boots and moving round him confidently. At this stage a handful of meal or pellets can be sprinkled on the floor about the attendant's feet or held in the hand at piglet level. In most cases the litter will nuzzle the feed and once they get the taste more is placed on the floor in the immediate vicinity.

(b) If the above method is not successful, meal or pellets should be placed in the water trough and barely covered with milk. The piglets' noses should be pushed into this until they get the taste and then more feed added until dry feed is being taken.

(c) As an alternative to (b) a gruel can be made up of the feed plus water and placed in a large, flat pan. The piglets are placed in the pan and will very quickly get the taste of the feed either by nosing in the dish or licking each other.

(d) When the litter are being introduced to their feed the heat lamp should be turned off. In general the provision of too much warmth will tend to reduce intake rather than stimulate it.

It is emphasised, however, that difficulty in starting piglets on their feed is very seldom experienced.

Feed Mixtures Used

In the evolving of rations for baby pigs three factors are important. The first is that the mixture must include some fat and contain sufficient protein and carbohydrate in a concentrated form to provide for rapid growth. For this reason the basis of the No. 1 ration is buttermilk powder. Secondly, the feed must be rich in the vitamins needed to support growth and thrift. The addition of meat meal, maize meal, and wheat meal provides some of these vitamins; others are added directly. Thirdly, the feed must be highly palatable so that the piglets will take it readily and, equally important, eat a lot. For this reason sugar is included and maize and wheat meal are used rather than barley. Barley is the least palatable of the commonly used grains. The mixtures may be fed as meal or pelleted. Pelleting increases the cost of the feed, but this is offset by the convenience, the greater efficiency of use by the pig, and the greater consumption obtained with pellets. These are now available commercially.

When the litter has begun to feed enthusiastically the small trough should be replaced, preferably with a self feeder that will hold several weeks' supply of feed.

Results with Hand Rearing

The following table shows the weekly weights of litters raised on the sow compared with litters that were hand reared as outlined:—

AVERAGE WEIGHT PER PIG (lb.)

Weeks	Method of rearing: Reared by sow	Early weaned (1 week)
0	3.2	3.3
1	5.7	5.6
2	9.4	8.2
3	13.0	10.3
4	16.7	13.3
5	21.7	19.2
6	27.3	26.1
7	34.4	34.2
8	42.5	42.7

The hand-reared piglets do not grow as rapidly as those reared by the sow over the second to sixth weeks. They then catch up and pass them. In addition, when the hand-reared piglets reach 8 weeks they are already living on their fattening ration and they suffer no check at this time. It is hoped that by further research it will be possible to improve the present rations so that better growth can be achieved over the first few weeks. If this can be done, a 50lb. or 60lb. pig at 8 weeks should be possible. At present it is claimed that pigs can be hand reared as successfully as they can be reared on the sow.

Feed Requirements Compared of Pigs Allowed to Suckle and Early Weaned Pigs

The fact that pigs can be satisfactorily raised after being weaned at 1 week having been established, an examination can be made of the effects of a hand-rearing system on the over-all use of feed on a dairy farm. The starting point in the production of a pork pig is the mating of the sow. Then follows pregnancy, lactation, and finally fattening. For purposes of illustration, the pig weaned is assumed to be 40lb. liveweight, yielding a carcass of about 26lb., and the pig marketed is 100lb. liveweight, yielding a carcass of 74lb. The effect of the early weaning system on each of these phases of production will be examined separately.

FEED MIXTURES USED

No. 1 (Fed from 7 Days to 28 Days)

	Parts
Buttermilk powder	65
Wheat meal	10
Maize meal	7
Meat meal	10
Sugar	8
	100

No. 2 (Fed from 28 Days on)

	Parts
Buttermilk powder	10
Meat meal	10
Barley meal	80
	100

Plus

	Per 100lb. of mix
Salt	8oz.
Ferrous sulphate	2oz.
Vitamin A	50,000 I.U.
Vitamin D_3	9,000 I.U.
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1. The Feed Requirements of Sows during Pregnancy

When a sow suckles her litter she usually loses weight. This loss will vary from small amounts to 80lb. or 100lb. When she is weaned this weight must be regained during the following pregnancy and, in particular, to obtain satisfactory matings, a large part of it must be put on in the first month after she weans her litter. The Department of Agriculture recommendations are as follows:—

FEED REQUIREMENTS OF A SOW DURING PREGNANCY

Weeks	Units per day	Units
First 4	6	168
Second 4	3	84
8 to 14	2	84
14 to 16	4	56
Total		392

On the other hand when the litter is early weaned the sow is relieved of the strain of a heavy lactation and loses little if any weight. A suitable feeding programme for such a sow is as follows:—

	Units per day	Units
*First week	2	14
1 to 3 weeks	4	56
3 to 6 weeks	2	42
6 to 16 weeks	Grass	
16 to 18 weeks	4	56
Total		168

* An average period between weaning and mating is 14 days.

Sow feed overhead is thus reduced to 43 per cent. of that required by animals suckling their litters in the usual way; grass is exploited more fully without penalising the sow's reproductive efficiency.

2. The Feed Requirements during Lactation

A sow suckling a litter of 6 pigs (which is slightly above the Dominion weaning average) requires 8 units of feed per day. The total feed used over 8 weeks is therefore 448 units. In addition the piglets will eat about 20 units each in the creep, a total of 120 units. In comparison an early weaned litter will be dependent on the sow for 7 days. Over this period the sow will receive 8 units a day, 56 units in all. After weaning at 7 days the litter will eat 120lb. of No. 1 mixture, 120lb. of No. 2, and 78 gallons of separated milk between 1 week and 8 weeks of age, a total of 318 units.

The above figures may be seen more clearly in the table at right.

3. The Feed Requirements during Fattening

Approximately 145 feed units are required to raise a weaner of 40lb. to a liveweight of 100lb. There is a slight advantage in early weaning in that no check in growth occurs at 8 weeks. However, for purposes of these calculations it is assumed that pigs reared under the two systems are on an equal footing when they reach 8 weeks of age, and require the same quantity of feed to reach market weight.

METHOD OF REARING

	Litter suckled	Litter early weaned
Feed required per pig		
To 56 days	160	90
Weaning to 74lb. carcass	145	145
Total	305	235
305 units made up of:		235 units made up of:
285 gals. milk		195 gals. milk
20lb. meal at 4.5d.	7s. 6d.	20lb. No. 1 ration at 6.7d.
Value of carcass	80s. 2d.	20lb. No. 2 ration at 4.5d. 18s. 8d.
		Value of carcass 80s. 2d.
Net return	72s. 8d.	Net return 61s. 6d.
No. gals. fed	285	195
Return per gallon	3.06d.	3.78d.

MATING AND FARROWING TIMES COVERING 1 YEAR

Method of rearing	Spring litter			Summer litter		
	Mate	Farrow	Wean	Mate	Farrow	Wean
Suckled	10 March	1 July	25 August	1 Sept.	23 Dec.	7 Feb.
Early weaned	10 March	1 July	8 July	29 July	19 Nov.	26 Nov.

Total Feed Requirements from Mating to Market

It is now possible to compare the total feed requirements of the two systems from mating to market:—

	Litter suckled	Litter early weaned
Feed cost per pig to weaning	160	90
Weaning to fattening	145	145
Total	305	235
Consisting of	285 gals. milk 20lb. meal	195 gals. milk 40lb. meal

Thus, by early weaning it is possible to market a pig on 77 per cent. of the feed needed by one raised on the sow. In terms of separated milk the feed saving is 33 per cent.

Economics of Early Weaning

Obviously, the pounds, shillings, and pence aspect of hand rearing must be presented before the method can be confidently recommended. The rations used are expensive and this could lead to the impression that there is no economic advantage to be gained by adopting the system. Most pig producers both breed and fatten and the following calculations are based on this assumption.

COMPARISON OF FEED REQUIREMENTS OF SUCKLING AS AGAINST EARLY WEANING SYSTEM OF REARING

	Litter suckled Units	Litter early weaned Units
Sow		
Pregnancy	392	168
Lactation	448	56
	840	224
Piglets		
Birth to 8 weeks	120	318
Total for sow and piglets	960	542
Feed units per pig to 8 weeks	160	90

The price quoted for pork is 1s. 1d. per pound, which is the minimum a producer will receive in the 1955-56 season under the floor-price scheme (see table above).

This increase in returns of 0.72d. per gallon of milk is equivalent to 1.3d. per pound of butterfat produced. Similar calculations can, of course, be made based on current pig meat prices at any time. If pig meat is 1s. 6d. per pound, the increase in return through early weaning would amount to slightly more than 2½d. per pound of butterfat.

Management Advantages from Early Weaning

To make full and efficient use of dairy by-products sows must be farrowed in late winter and again in summer. Sows which return to the boar, and subsequently farrow late, are a problem. The second litters from such sows face a falling milk supply and unless meal is used to finish them, they must remain on the farm in store condition for the winter. Feeding meals to pigs approaching market weights is the least profitable method of using supplements.

Early weaned sows can be successfully mated at least 5 weeks earlier than sows suckling their litters. An example will illustrate this point (see table above on mating and farrowing times covering 1 year).

The date shown for remating following the early weaning of the spring litter is the latest likely one. Usually the sow can be mated earlier.

Three points need emphasis. The first is the obvious advantage of farrowing the summer litter in November instead of December. The second is the fact that under New Zealand conditions where sows must be farrowed in relation to the milk supply only two litters should be taken from the sow under the early weaning system despite the fact that 2½ litters could be fitted in comfortably. If an attempt is made to fit in extra litters, the situation must soon arise where farrowing times are com-

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pletely out of step with feed supply. The third is that the summer litter should be early weaned in the same way as the spring litter. This should be done to take advantage of the increase in efficiency that the system offers. It does involve, in terms of the example, leaving the sow empty from 26 November to 10 March.

Many farmers believe from sad experience that "holding sows over", that is, not mating at the first heat after weaning, results in a permanently empty sow, or at least one that is difficult to get in pig. Experience at Ruakura indicates that no difficulty need be experienced if the following simple rules are adhered to. When the litter is weaned the sow should be allowed no feed other than grass and, if necessary, she should be confined to a pen to keep her condition fairly low. Three weeks before the planned mating time she should be fed 4 gallons of milk per day, plus grass. The flushing effect of this feeding should result in a normal heat period and a successful mating.

Nutritional Principles Involved in Early Weaning System

The end result of an average pregnancy and lactation is a litter of pigs each yielding a carcass of 26lb. and costing 160 units of feed. This represents an outlay of 6 units for each pound of meat produced. By comparison, during the fattening stage, 145 units are fed to provide a carcass gain of 48lb.—3 units per pound of meat. Reproduction is therefore only half as efficient as growth after weaning. Early weaning reduces the feed cost of a weaner to 90 units, thus increasing the efficiency of the reproductive phase to 3.5 units per pound of meat produced. There are two reasons for this improvement in efficiency.

The first, the greater exploitation of pasture by the pregnant sow that has not lost condition through lactation, has already been mentioned. The second is the fact that feed is used more efficiently by the little pig than by the sow. The sow is a rather expensive middleman and should be dispensed with, if possible, as a source of feed to the litter.

A study of the feed records and the weight gains of sows and litters used on milk production studies at Ruakura has shown that during the first 4 weeks of lactation, when all the feed received by the piglets is obtained from sow's milk, 4 units fed to the sow produced a gain of 1lb. in the litter. Over the last 4 weeks, when a proportion of the litter's intake came from the creep, only 3.5 units were needed to produce 1lb. of gain in the litter. In a further experiment it was found that when a litter received no creep feed 5.3 units fed to the sow were required to produce a pound of litter gain. Where creep was fed only 3.6 units were needed, consisting partly of sow feed and creep feed. The conclusion is that the more feed the litter takes directly from the trough the greater is the feed economy. By the use of the early weaning technique the sow is relieved of her role as a milk factory and the efficiency of the piglet as a feed converter is exploited to the full.

Effect of Early Weaning on Stock Numbers

The unique feature of New Zealand pig keeping is the simultaneous production and consumption of a daily feed supply. Separated milk or whey must be consumed as it is produced if the full value of its food content is to be exploited. Any saving in one phase of production must therefore be diverted immediately to another. For example, a reduction in the feed required by sows means that this saved feed must be consumed by fattening pigs.

To achieve this result more fattening stock must be kept, which means that more sows must be farrowed. Where 5 sows are now run to consume the milk from 40 cows producing 12,000lb. of fat (a reasonable target) an extra two could be run if all litters were early weaned.

Effect of Early Weaning on Type of Production

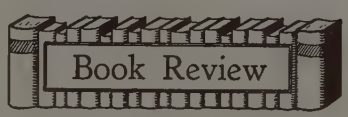
For some years the Department of Agriculture and the New Zealand Pig Producers' Council have recommended that the greater part of pig meat output should be in the form of pork rather than bacon. For making the most efficient use of feed this recommendation is sound. Any improvement in litter size through the use of more prolific stock and any reduction in losses through elimination of overlaying and disease will tend to strengthen this recommendation. Similarly, any progress toward reducing the feed requirements over pregnancy and lactation will have the effect of lowering the feed costs of each weaner and reducing the weight at which it should be marketed in order to make the most profitable use of farm feed supplies.

The early weaning technique which marks a substantial advance in reducing sow overhead feed costs must have the effect of increasing the profit margin of pork over bacon.

Advantages

The advantages of the early weaning system may be summarised as follows:—

1. It reduces the milk and meal requirement of the sow during pregnancy and allows greater exploitation of grass as a sow feed.
2. It reduces the feed costs from birth to 8 weeks.
3. It makes earlier farrowing of summer litters possible so that all pigs can be marketed before milk supplies fail at the end of the season.
4. It increases the return per gallon of separated milk or per pound of butterfat produced.
5. It makes the production of pork as compared with bacon even more desirable.
6. It involves keeping more sows if the feed savings effected are to be efficiently used.



"Wool Away": G. Bowen

MR. GODFREY BOWEN, who shore 456 sheep in a 9-hour day in 1953, needs no introduction to New Zealanders. Since February 1954 he has been employed by the New Zealand Wool Board as its shearing instructor and has done a good job demonstrating and teaching his technique to prospective and experienced shearers and others interested and has shown the art of shearing in a new light.

The technique which enables Mr. Bowen to shear high tallies and to make a first-class job is described and well illustrated in his book. The modern method of crutching is similarly described.

Concentration is required to orient Mr. Bowen's use of the terms "near" and "off" on page 21. The careful and detailed description of his shearing technique would have been easier to follow if he had used the terms as they are usually applied to animals.

Mr. Bowen emphasises that quality of work is an essential attribute of a good shearer. He gives useful hints on catching and handling sheep, shearing tough sheep, shearer's dress and diet, and maintenance of shearing gear. He discusses shearing competitions and offers constructive suggestions how these should be conducted.

Sections of the book describe work in the shed, design and planning of woolsheds and sheep yards, and sheep breeds and their shearing qualities. A glossary of shearing terms is included.

—*G.L.W.*

Whitcombe and Tombs Ltd. 17s. 6d.

Care of Livestock during January

[*Green and Hahn*

Lambs being fattened on rape. Rape should not be grazed by lambs until the leaves show a purplish tinge.

Contributed by the Animal Research Division

WEANING is an important event in the life of a lamb and special care at this time will be well repaid. Long-wool lambs should be shorn and all others crutched.

WEANING LAMBS

If the weather is wet, lambs should be given a full dose of 20 grammes of phenothiazine at weaning; otherwise drenching may be postponed until the advent of rain. If fattening crops are not available, lambs should be drafted into "clean" paddocks. Lambs should never be weaned into paddocks in which ewes and lambs have been grazed during the previous month. Unless very good paddocks of spelled pasture are available, hoggets should be spread thinly over as large an area as possible.

Rape should not be grazed by lambs until the leaves show a purplish tinge. "Unripe" rape does not fatten lambs so quickly and seems to "scald" them more readily.

FODDERS FOR LAMB FATTENING

Best results are probably obtained by grazing rape in breaks which last the lambs about a week. Keeping lambs on a break until the last leaf is eaten is false economy; they should be moved on while they are still getting a full feed, and the paddock can be cleaned up with ewes. Run-offs have little to recommend them, and unless they contain good pasture, they will depress the lambs' rate of growth. If hay is fed, it must be of the very best quality. Thousand-headed kale is splendid lamb-fattening fodder, but because it is relatively unpalatable, it must be managed properly. It must always be fed in small breaks and grazed only lightly before the lambs are moved on to the next break. A run-off should never be used. Treated in this way, kale makes excellent regrowth and can be regrazed several times; if necessary, grazing can be extended into autumn and winter.

Modern sheep dips are so effective that the eradication of lice and ticks should be quite feasible. However, best results will be achieved only if the instructions for mixing and replenishing dips are followed accurately. Carelessness in dipping can cause disastrous losses. If sheep are dipped off shears, the shear cuts are likely to become infected and deaths from blood poisoning may occur, but this can be prevented by vaccinating the sheep with blackleg vaccine at least a fortnight before dipping them. The vaccine is available at a reasonable price. Veterinarians or Livestock Instructors should be consulted about its use.

DIPPING OF SHEEP

After lambs have been weaned the ewes should be gone through carefully to select those which require culling. Feet and wool should be examined carefully. Special attention should be paid to udders and teats, and ewes should be culled if they have defective udders or very large or damaged teats, as the lambs of such ewes often die from starvation before they are a week old. Provided ewes are in reasonable condition and have sound udders and good fleeces, they should be retained. Even "gummy" ewes will rear satisfactory lambs on good pasture. Lambing percentage increases with the age of the sheep and reaches the highest level when the ewes are 5 to 8 years old. Many ewes on fat lamb farms could well be kept for 1 or 2 years longer, but fat ewes which have not reared a lamb should be culled. Ewes should be kept on low rations for 2 months after weaning to prevent their becoming overfat.

CULLING OF EWES

Sheep that eat St. John's wort become sensitive to sunlight and develop scabs on the ears, face, and back. If sheep in such a condition are dipped, they take convulsions and may be drowned. If possible, sheep should be grazed on country free from St. John's wort for several weeks before they are dipped. If that is not possible, they should be dipped only on dull days.

ST. JOHN'S WORT MAKES DIPPING DANGEROUS

Serious lameness in cattle can be caused by their eating hay heavily infested with ergot. Such hay can be easily recognised by the black ergots which replace the seeds of rye-grass and other grasses. Where ergot is known to occur hay should be made before the grasses have time to seed.

ERGOTISED GRASS MAKES DANGEROUS HAY

Campaigns for foot-rot eradication should be started as soon as the lambs have been weaned. Once foot-rot has been eradicated from a flock it does not recur unless it is reintroduced from outside. Department of Agriculture Bulletin No. 825, gives full instructions for eradicating foot-rot from a flock.

ERADICATION OF FOOT-ROT

Cereal Harvest and Grass-grub Control

Seasonal Notes by the Extension Division

TO ensure the smooth working of machinery and a good grain sample consideration should be given to harvest operations.

THE CEREAL HARVEST

THE harvest concludes the year's work on cereal paddocks and efficient harvesting is essential for maximum returns. Worn, bent, and broken parts on all harvesting machinery likely to waste valuable time when threshing is being done should be repaired without delay. Decisions as to whether to direct head or windrow with a binder will be made as the crop ripens. Generally wheat—except for a few varieties subject to wind damage—will stand until header-ripe and should be direct headed. Oats are best windrowed. Barley that ripens evenly and is free from second growth, tall weeds, or severe lodging may be direct headed. Windrows should be laid on a long stubble if the height of the crop permits.

THRESHING THE CROP

In threshing, the essential aim should be to secure a clean, undamaged sample without undue loss of grain. The crop should be mature, with the grain hard and having a moisture content below 16 per cent. Standing crops lose moisture rapidly in favourable weather, but once in the bag grain takes a week or more to lose 1 per cent. of moisture. The labour of turning bags and the risk of further rain make it unwise to head an out-of-condition crop. The header capacity should be adequate to the task. Poor threshing, damage due to the return of grain to the drum, and losses due to grain being carried over with the straw result when headers become overloaded. Reducing forward speed or narrowing the "cut" should overcome these difficulties. Undamaged samples are particularly important in malting barley, with which consistently high germination is essential. Slow drum speed with the maximum concave clearance will allow thorough threshing. Adjustments are necessary to drum speed during the day, as the crop dries out with the heat and toughens again toward evening. Header screens to separate out shrivelled, broken, and immature grains should be used.

—C. P. WHATMAN

* * *

GRASS-GRUB CONTROL

CHEMICAL control with modern insecticides is efficient and economical for combating grass-grub in pastures. Both B.H.C. and D.D.T. insecticides have proved successful in extensive trial work. For general grazing land where grass-grub alone is present or where not more than 2 years' life of pasture is required either of the following treatments is recommended:—

(a) 1lb. of 100 per cent. para para isomer D.D.T. per acre, or its equivalent at lower percentages (for example, 2lb. of 50 per cent. p.p.i. or 4lb. of 25 per cent. p.p.i.); or

(b) 1lb. of 100 per cent. gamma isomer B.H.C. (lindane) per acre or its equivalent at lower percentages. (B.H.C. is benzene hexachloride.)

Where 3 years' production at a higher level of control is required double the above dosages should be applied.

For high-return pastures or crops or where both grass-grub and subterranean caterpillar are present 100 per cent. p.p.i. D.D.T. or gamma B.H.C. at 2lb. per acre should be used. The D.D.T. may be applied by using manufacturers' mixes of D.D.T. at the recommended rate according to the concentration of the mixture. Alternatively, the necessary quantity of p.p.i. D.D.T. should be thoroughly mixed with a spreader, usually fertiliser or lime. Mixing for 3 minutes at 25 revolutions per minute in a concrete mixer with tumblers ensures a uniform distribution of the very small quantity of insecticide. This mixture should be applied to close-grazed and preferably dry pasture on a calm day with an ordinary topdresser with bags attached behind even in slightly breezy weather. Spin topdressers should not be used. At least 1in. of rain should fall before the pasture is restocked. Applications in spring or autumn give good control.

—R. B. GORDON

* * *

LAYING DRAIN TILES

BEFORE laying of drain tiles is begun the trench bottom should be checked for even, continuous fall and a solid foundation. Boning rods, or preferably a dumpy level worked from set pegs, should be used for this check. To facilitate laying of the tiles they should be placed close to the edge of the drain within easy reach of the operator. Working in the trench is satisfactory only when the bottom is firm and dry. Under wet conditions heavy boots soon stir up enough mud to make efficient tile laying impossible. Standing on each tile as it is laid will not overcome this problem, as the operator's weight tends to displace tiles lying on a soft bottom. When using a tile hook the operator stands on ground level beside the trench. Each tile should be laid tightly against the preceding one to ensure the smallest possible opening between tile ends. The irregular ends of tiles provide sufficient space for water to enter. Misshapen tiles not fitting closely should be placed so that any gap occurs at the bottom and not at the top, where it would allow backfill material to drop through. Sufficient spoil to hold the tiles firmly in position should be placed in the trench before the main bulk of backfill is returned.

—J. F. SCOTT

* * *

SEED-BED PREPARATION FOR NEW PASTURES

OVER the past few years an increasing number of farmers have been renewing some of their poorer pastures to introduce better herbage strains. Such pasture renewal is frequently preceded by a crop; in others a straight-out grass-to-grass policy is favoured. When the area is to be sown directly grass to grass, or if there is a considerable quantity of crop residue or weeds after a crop has been fed off, ploughing is recommended, as this will give a clean ground surface to work on. On lighter soils rolling on the furrow should then follow, as this will compact the furrow and is a valuable first step toward getting the final consolidation that is so essential. Discing and harrowing, followed by a final rolling, should result in the production of a seed-bed with a good, firm tilth. Seed is often sown on too loose a seed-bed, particularly on the lighter soil types, and clover establishment in particular is frequently very poor under such conditions. Implements such as the giant discs and the rotary hoe are apt to produce a very loose seed-bed, unless they are used sufficiently early to allow the land to settle down before the seed is sown. When a paddock has been in crop and utilisation has been sufficiently good to leave a relatively clean surface ploughing is not necessary, and a light discing, followed by harrowing and rolling, should be sufficient to produce a satisfactory seed-bed. Unfortunately rollers are not as plentiful as they should be in some areas, and the seed-bed is not given the rolling that so often makes all the difference between a good and a fair seed-bed. The driving of a mob of sheep over the area before the seed is sown is an excellent substitute for the roller and is recommended, particularly on the lighter soil types.

—A. V. ALLO

Trace Elements for Animals in New Zealand

By I. J. CUNNINGHAM,

Superintendent, Department of Agriculture Animal Research Station, Wallaceville

THOUGH a great deal has been said and written about trace elements and their relation to animal health, there still exist a lot of misunderstandings and vain hopes of the things trace elements can do for animals. Sometimes through these misunderstandings the need for supply of trace elements is not recognised; sometimes the vain hopes lead to the use, as fertiliser or salt lick, of all sorts of mixtures that have no value at all. This article is intended to be a simple statement of the present position in New Zealand, and a guide to the rational use of trace elements for farm animals.

THERE are two ways in which trace elements can improve the feeding of animals. They can be used as fertilisers on deficient soils to increase the growth of feed and thus provide the animals with more to eat or they can be used to overcome a deficiency of a trace element which is needed inside the animal for its own proper functioning.

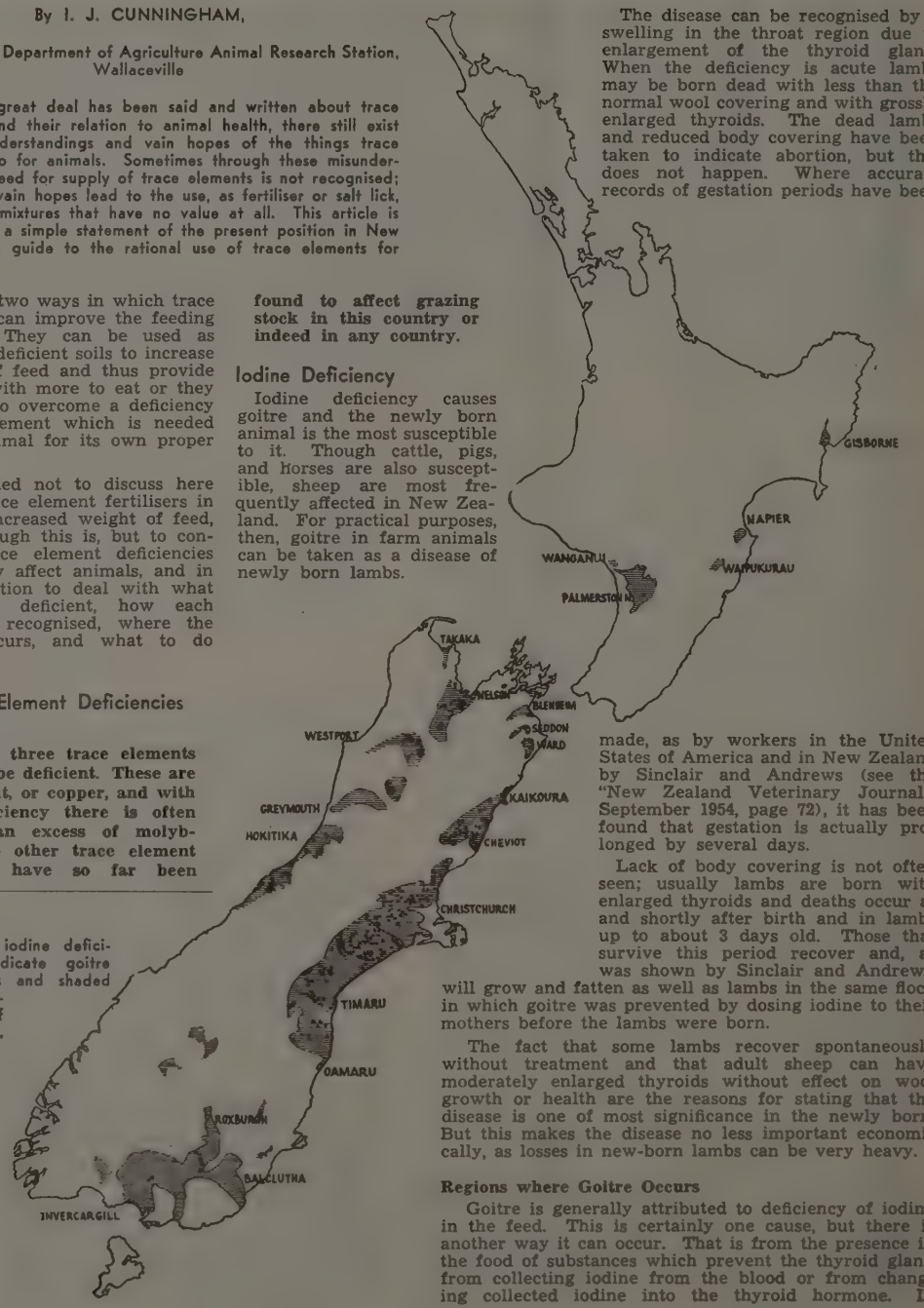
It is intended not to discuss here the use of trace element fertilisers in growing an increased weight of feed, important though this is, but to consider the trace element deficiencies which directly affect animals, and in this consideration to deal with what elements are deficient, how each deficiency is recognised, where the deficiency occurs, and what to do about each.

What Trace Element Deficiencies Exist

There are three trace elements which may be deficient. These are iodine, cobalt, or copper, and with copper deficiency there is often associated an excess of molybdenum. No other trace element deficiencies have so far been found to affect grazing stock in this country or indeed in any country.

Iodine Deficiency

Iodine deficiency causes goitre and the newly born animal is the most susceptible to it. Though cattle, pigs, and horses are also susceptible, sheep are most frequently affected in New Zealand. For practical purposes, then, goitre in farm animals can be taken as a disease of newly born lambs.



Occurrence of iodine deficiency: Dots indicate goitre cases in lambs and shaded portions probable areas of goitre incidence.

The disease can be recognised by a swelling in the throat region due to enlargement of the thyroid gland. When the deficiency is acute lambs may be born dead with less than the normal wool covering and with grossly enlarged thyroids. The dead lambs and reduced body covering have been taken to indicate abortion, but this does not happen. Where accurate records of gestation periods have been made, as by workers in the United States of America and in New Zealand by Sinclair and Andrews (see the "New Zealand Veterinary Journal", September 1954, page 72), it has been found that gestation is actually prolonged by several days.

Lack of body covering is not often seen; usually lambs are born with enlarged thyroids and deaths occur at and shortly after birth and in lambs up to about 3 days old. Those that survive this period recover and, as was shown by Sinclair and Andrews, will grow and fatten as well as lambs in the same flock in which goitre was prevented by dosing iodine to their mothers before the lambs were born.

The fact that some lambs recover spontaneously without treatment and that adult sheep can have moderately enlarged thyroids without effect on wool growth or health are the reasons for stating that the disease is one of most significance in the newly born. But this makes the disease no less important economically, as losses in new-born lambs can be very heavy.

Regions where Goitre Occurs

Goitre is generally attributed to deficiency of iodine in the feed. This is certainly one cause, but there is another way it can occur. That is from the presence in the food of substances which prevent the thyroid gland from collecting iodine from the blood or from changing collected iodine into the thyroid hormone. In

either case the result is goitre. Brassica crops probably contain such a substance. Thus more goitre might be expected when ewes are wintered on brassica crops.

The regions in New Zealand where goitre is likely to occur are shown on the accompanying map. This has been compiled from two sources. The first is a record of all known cases of goitre that have occurred in this country; the second is from analyses of thyroid glands collected from lambs slaughtered at freezing works, which showed those districts in which lamb thyroids were low in iodine content. The outbreaks of goitre were mapped by the writer with information from a number of Stock Inspectors; the results of examination of thyroids was summarised by D. F. Waters in "The New Zealand Journal of Agriculture" (February 1939, page 117), and E. D. Andrews of the Wallaceville Station synthesised the two series to show the areas mapped. This map shows as dots areas where outbreaks of goitre have occurred and areas probably affected as shaded portions; the map can be regarded as giving a general indication of the likely areas for occurrence of goitre, but the brassica-induced goitre already mentioned might develop anywhere.

Control of Goitre

Goitre is controlled by feeding iodine and, since the new-born lamb is most susceptible, it is essential that iodine be given to the pregnant ewe so that it can reach the developing lamb before birth. The most effective time is the latter half of pregnancy, as at this period the thyroid of the foetal lamb is forming.

Iodine is usually supplied in licks, and potassium iodide is the salt most frequently used. This salt is unstable when exposed to weather and iodine may be lost. To overcome this the amount of potassium iodide in licks is increased or the iodide is "stabilised". Neither method is fully effective. **Potassium iodate** on the other hand is a source of iodine which is effective in the control of goitre and which is stable when mixed and exposed in licks. It is hoped that it will eventually be made legally essential for iodised licks to contain this compound.

Sinclair and Andrews have shown that goitre in lambs can be controlled by drenching ewes with 140 mg. of potassium iodide (1/200oz.) on six occasions, at weekly intervals, toward the end of gestation. They have even had indications that less frequent drenching might be effective. When this is fully worked out the drenching procedure may prove to be more efficient and economical than using licks; one great advantage is that every ewe is treated. Doses much higher than the one mentioned will poison sheep.

Supplying iodine by topdressing is unfortunately not feasible.

Goitre is fairly straightforward. The disease is important for the newly born lamb and can be prevented by feeding iodine in licks or by drenching. Preventive treatment must be given to the in-lamb ewe.

Cobalt Deficiency

There must be many still farming who had direct experience of severe cobalt deficiency in their stock. Only sheep and cattle were affected and they could live for no more than a few months on badly affected land. The animals lost appetite, wasted away, and died with all the appearances of chronic starvation, even though there was ample feed available. With the correct use of cobalt the deficiency disease has been banished on these once acutely deficient areas.

But cobalt deficiency still exists in a milder and more insidious form. To this milder deficiency the reaction differs according to species and age; cattle are less susceptible than sheep and adult sheep less susceptible than lambs. In consequence lambs can be unthrifty through shortage of cobalt while on the same farm adult sheep and cattle are healthy. The effect is most obvious after weaning and often results in a bigger "tail" of unthrifty lambs and sometimes a number of deaths.

Recognition of cobalt deficiency is not easy because the unthriftiness from cobalt deficiency can readily be confused with unthriftiness from other causes such as lack of feed, parasitism, or hogget unthriftiness of unknown cause. There are, however, some points that can be of help in diagnosis. If young stock are healthy and adult sheep or cattle unthrifty, cobalt deficiency is excluded. On the other hand, if young stock are affected while adult animals are healthy, the possibility of cobalt deficiency exists. This alone is not sufficient to establish a diagnosis of cobalt deficiency. The best diagnostic aid and most certain sign of cobalt deficiency is the response in appetite and growth when cobalt is dosed to deficient animals.

To be really certain of recognising a mild cobalt deficiency a farmer should run a drenching trial, starting shortly after weaning, using two groups of about 20 lambs each. One group is untreated and serves as the control; each animal in the other group is dosed once a week with a mixture made as follows: 1oz. of cobalt sulphate crystals is dissolved in 1 pint of water; 3½ fl. oz. of this solution is diluted to 1 gallon. The weekly dose per sheep is 1oz. of the dilute solution.

When cobalt deficiency is slight an improvement in dosed animals may not be detectable by eye alone. It is important therefore to weigh the groups at the beginning of the experiment and again at the end 2 months later. An average difference of 6lb. or more in favour of the drenched group will confirm cobalt deficiency.

Analyses of pastures or of livers also help in diagnosis. Such analyses are costly and slow and in most cases of borderline deficiency a quicker and more certain answer can be got from a drenching trial.

Distribution of Cobalt Deficiency

A general description of the areas affected by cobalt deficiency is given in the Department of Agriculture's Bulletin No. 180, "Cobalt Deficiency in Sheep and Cattle". More detail supported by maps will be given in an article by E. D. Andrews in a later issue of the "Journal". Here it is sufficient to say that very considerable areas may be affected in North Auckland, East Cape, King Country, Hawke's Bay, Wairarapa, Canterbury, Otago, and Southland.

If a drenching trial such as that described were carried out on farms where weaned lambs consistently fail to thrive, there would be a quick answer to the distribution of mild cobalt deficiency and a good return from the use of control measures.

Control

Cobalt deficiency can be controlled by supplying cobalt by mouth. No other way of administering it to animals is of any use. Drenching is, however, impracticable except for diagnosis. Licks containing 4oz. of cobalt sulphate per ton are satisfactory if taken all the year round by all stock, but their great disadvantage is that all stock do not take the lick.

Topdressing with cobalt is the most effective control method; 5oz. of cobalt sulphate per acre per annum is adequate and this is supplied by 2cwt. per acre of cobaltised superphosphate in the North Island and by 1cwt. per acre of South Island cobaltised superphosphate.

Autumn topdressing is satisfactory where grassland farming is carried on, but where ewes are held on crops over winter the effect of cobalt topdressed on to pastures in autumn is gone by late spring, when lambs need the cobalt. If ewes have been wintered on crops, cobalt may have to be applied in spring and a suitable method is to spray pastures with a solution in water, using 5oz. of cobalt sulphate per acre.

Copper and Molybdenum

Diseases due to copper deficiency and molybdenum excess have been fully described in two recent articles in the "Journal" (April 1954, page 369, and February 1955, page 196), the first of which is available as Bulletin No.

238, "Copper Deficiency in Cattle and Sheep", and the second as Bulletin No. 378, "Molybdate Topdressing and Animal Health". Only a summary is therefore given below.

Copper deficiency in this country is of two types: a straight-out deficiency on some peat and sandy soils and a slight deficiency associated with high molybdenum in the pasture on most peat soils, on pumice soils in the Wairoa district, and on some areas of North Canterbury.

When sheep are copper deficient their lambs have thin bones which often break, or young lambs may develop ataxia. The wool of Merinos or half-breds may lose its crimp, but this effect has not been observed in British breeds in New Zealand. There is no clear evidence that unthriftiness of hoggets results from copper deficiency.

In cattle copper deficiency causes unthriftiness, anaemia, and loss of coat colour. Calves sometimes have fractured bones.

A shortage of copper complicated by extra molybdenum in cattle produces poor calves which incline to suffer broken bones, intense spring scouring in calves and older cattle, loss of coat colour, and reduced production. Usually scouring ceases and cattle improve in condition and production in summer, when molybdenum content of pasture falls.

Effect on Sheep Uncertain

The position regarding sheep on pastures containing high levels of molybdenum is not entirely clear. On some such areas sheep do well while cattle are badly affected; on other areas there is ataxia in lambs and unthriftiness in hoggets. This appears contradictory and the first thing that must be done is to find out by experiment whether molybdenum does harm lambs or their ewes.

Experimental dosing of ewes with molybdenum for 5 years did not produce any disease in the ewes or the lambs. In another experiment ewes have been kept on pastures topdressed with molybdenum to raise the molybdenum content. This experiment has reached the stage of the birth of the third crop of lambs with no evidence of disease so far. There is therefore no clear evidence yet on whether excess molybdenum will cause disease in sheep. What does happen is that the extra molybdenum in the feed causes loss of copper from the sheep and the question whether this can proceed far enough to affect health has yet to be worked out.

Copper : Molybdenum Effects

At this point some comments might be made on the relation between copper and molybdenum in animals, because this relation is somewhat complex. The description which follows may help in understanding this.

If a cow is living on grass which contains the normal amount of copper, the liver of the cow will have a copper content of between 100 and 200 parts per million. If a little extra molybdenum is fed either by dosing or by increasing the molybdenum in the grass, not much happens. As the amount of extra molybdenum is increased a point is reached where the amount of copper in the liver begins to fall. Within limits the more molybdenum that is fed the quicker and greater the fall will be. If copper in the feed is low, a small excess of molybdenum causes loss of copper from the animal; if copper in the feed is normal, a much greater excess of molybdenum is required to affect the animal's copper stores.

From this it will be apparent why excess molybdenum is specially harmful when there is a copper deficiency and why the harmful effect of excess molybdenum can be controlled by topdressing pastures with copper. Even this is not the whole story, however. In Australia Dick has shown that if there is a deficiency of sulphate in the feed, molybdenum is not excreted; it just banks up in the animal. Copper stays in the animal, but so does molybdenum, and the result is that the animal is in effect poisoned by molybdenum. This question of deficiency of sulphate does not arise in New Zealand because there is adequate sulphate in the pastures that contain excess molybdenum and this excess of molybdenum can be regarded as always being likely to cause depletion of copper from grazing animals.

The effect of excess molybdenum in producing disease in stock occurs in New Zealand only after the stock have been grazing pastures for some time and have become depleted of their copper. The final effect on cattle is clear and has been mentioned as severe scouring, unthriftiness, and brittle bones. The final effect on sheep has still not been worked out.

The recognition of copper deficiency is made from the symptoms outlined and can be confirmed where necessary by examination of livers for copper or pastures for copper and molybdenum. Generally these examinations are unnecessary, as symptoms considered with location of the farm are sufficient to make a diagnosis.

The control of copper deficiency is most simply and efficiently achieved by topdressing the whole farm each year with 5lb. of bluestone per acre. Full details of this and alternative methods are given in Bulletin No. 238.

The trace elements mentioned in this article—iodine, cobalt, and copper—are the only ones it is necessary to supply to farm stock in New Zealand, and the supply is necessary only in the areas known to be deficient or when there is evidence from animals that the minerals are needed.

The practice of using "shot-gun" mixtures of trace minerals has no justification and has proved of no value.

Radio Broadcasts to Farmers

RADIO broadcasts to farmers will be given during January as follows:—

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8.5 p.m., Wednesdays at 8.1 p.m. (Northland stock market report), Fridays at 8.1 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month), Thursdays at 12.33 p.m. and 7.15 p.m. (fortnightly).

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Wednesdays at 7 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 7 p.m.

"New Zealand Soil Bureau"

In the article "New Zealand Soil Bureau" in the October issue of the "Journal" reference to the work of Mr. J. A. Bruce in association with Sir Theodore Rigg both in the field and in the laboratory on the pioneer surveys of the Nelson Province was regrettably omitted.

Powerful Selection Tool in Hands of Farmer

Face Cover and Productivity in Sheep

THE relationship between the amount of wool on the face of a Romney ewe and her production of lamb and wool has recently been given some publicity by workers at Massey Agricultural College. This article adapted from a paper given at the Ruakura Farmers' Conference this year by I. J. Inkster, Research Officer, Department of Agriculture's Ruakura Animal Research Station, Hamilton, introduces to sheep farmers the concept of face cover, shows some of the effects of face cover on the productivity of ewes, particularly under hill country conditions, and discusses what use farmers can make of this information.

FACE cover refers to the **area** of the face **actually growing** wool; the length of the wool is not considered, nor whether wool has been shed from the face. To describe face cover four different classes are used. At left in the illustration on page 607 is an "open"-faced sheep. There is no wool growing forward of the eyes and such a sheep could never become wool blind.

In contrast at right in the illustration on page 607 is a sheep with a face described as "very covered". Sheep of this face-cover class have a complete ring of wool round the eyes, but the eyes are not always covered. This, of course, is an extreme case of wool blindness. This is the sort of sheep which is difficult to muster and work and which must be wigged at crutching. Most farmers will have literally "damned the eyes" of sheep such as this.

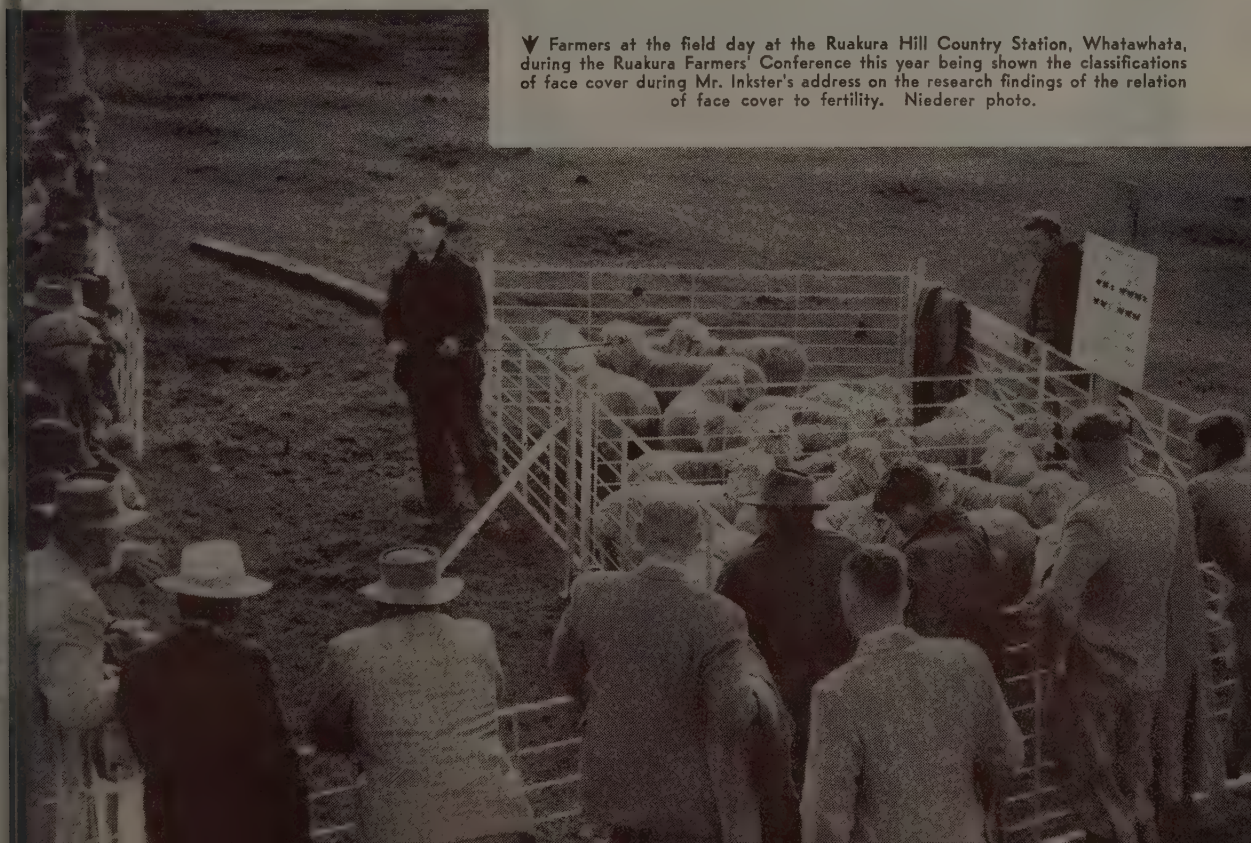
The intermediate grades of the classification system are: Sheep in the "slightly covered" grade, with wool on the face growing forward of the eyes, and sheep of the "covered" grade, in which the wool grows well forward on the face and down the nose, but does not completely encircle the eyes.

The grades are quite distinct, though the differences between them are not large. This should be borne in mind when the productions obtained from ewes of these different face-cover grades are presented.

Most farmers recognise that wool-blind sheep are at a disadvantage and they endeavour to minimise the effects of face cover by clipping the wool from the eyes or wigging at crutching. However, data obtained from widely differing sets of conditions indicate that face cover has a more profound effect on sheep than just causing wool blindness.

The first suggestion that face cover could affect productivity, particularly fertility, came from the United States. The sheep studied were fine-woolled ewes of the Rambouillet breed (a breed of Merino origin) running under range conditions. When the lifetime productions of these ewes were considered the following differences between open- and covered-faced sheep were found:—

1. Open-faced ewes had more twins.
2. They were better mothers and their lambs were weaned at heavier weights.
3. There were fewer dry ewes among open-faced ewes than among covered-faced ewes.
4. Open-faced ewes produced 1/5lb. less wool than covered-faced ewes.



Farmers at the field day at the Ruakura Hill Country Station, Whatawhata, during the Ruakura Farmers' Conference this year being shown the classifications of face cover during Mr. Inkster's address on the research findings of the relation of face cover to fertility. Niederer photo.

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Ewe with open face (left) and ewe with very covered face (right).

The net effect was that during their lifetimes open-faced ewes produced 11.2lb. more lamb per year and 1/5lb. less wool per year than did covered-faced ewes. These differences were present in spite of the fact that wigging was practised three times a year. It should be emphasised that these differences were obtained with sheep of the Merino type under range conditions in the United States.

However, similar results have been obtained in New Zealand with the Romney breed. At Massey College on flat country of quite high carrying capacity it has been found that open-faced ewes have over 20 per cent. more lambs than woolly faced ewes and have lambs which are heavier at weaning. The fleeces of open-faced ewes were ¼lb. to ½lb. lighter than those of covered-faced ewes. On a cash return basis the college has calculated that open-faced ewes return about 6s. a head per year more than covered-faced ewes. In addition there was some evidence that unshorn wether lambs with open faces grew more rapidly than those with covered faces.

Results at Ruakura Hill Station

Some data on the effects of face cover on the production of ewes under hill country conditions follow. In 1950 all the ewes on the Ruakura Hill Country Station were described for face cover, and the productions of these ewes were recorded throughout their lifetime (Table 1).

TABLE 1—AVERAGE YEARLY PRODUCTION OF EWES WITH DIFFERENT DEGREES OF FACE COVER, 1950-54

	Very covered	Covered	Slightly covered	Open
Percentage of ewes lambing	74	82	88	89
Average weaning weights of lambs (lb.)	47.3	49.1	51.1	51.6
Average weight of lamb weaned per ewe mated (lb.)	24.7	30.2	36.8	39.1
Average fleece weight (lb.)	7.9	7.6	7.7	7.3

These figures mean, comparing the extremes, that on the average there were 15 more barren ewes in 100 covered-faced ewes than in 100 open-faced ewes. Though the differences in average weaning weights are not very great, there is a steady increase from 47.3lb. in the very covered group to 51.6lb. in the open-faced group. These figures suggest, as do the American and Massey College figures, that open-faced ewes are better mothers than covered-faced ewes. The figures for the net production of lamb per ewe show that on the average each year open-faced ewes produced over half as much lamb again as ewes with very covered faces.

Though the average fleece weights of ewes from the different classes do not show the regular differences of the measures of fertility above them, these figures show that ewes with covered faces clip a slightly heavier fleece than those with open faces. Part of this difference would be due to the greater incidence of dry ewes in the covered classes. In considering wool returns per ewe, however, the wool from the lambs must be credited to the ewes, and on this basis open-faced ewes surpass those in the very covered category.

FACE COVER AND PRODUCTIVITY IN SHEEP . . .

A conservative calculation of the gross returns per ewe shows that on an average taken over 5 consecutive years ewes with open faces return nearly 7s. more per head per year than ewes with very covered faces.

These are average results taken over 5 seasons. When the performances of the ewes were examined season by season it was found that the differences in average per-year production between ewes of the different face-cover groups were due almost entirely to the very large differences which occurred when the ewes were 2-tooths (Table 2).

When the returns from ewe and lamb wool are included 2-tooth ewes with open faces grossed a little over 15s. more per ewe per year than 2-tooths with very covered faces.

Open-faced Ewes More Profitable

Summarised, the results of the American, Massey College, and Ruakura observations on the effects of face cover on the lifetime productivity of ewes show that open-faced ewes, in spite of slightly lower fleece weights, are more profitable than covered-faced ewes because of their higher fertility. Whereas the American and Massey College results show that

TABLE 2—PRODUCTIONS OF THE SAME GROUP OF EWES AS IN TABLE I AS 2-TOOTHS

	Face-cover class			
	Very covered	Covered	Slightly covered	Open
Percentage of ewes lambing	35	66	73	86
Average weight of lambs at weaning (lb.)	48.3	48.8	49.5	51.8
Average weight of lamb weaned per ewe mated (lb.)	16.9	26.0	31.2	38.3
Average fleece weight of ewes (lb.)	6.7	6.2	6.3	6.0

The first line shows how striking the differences were in the percentage of ewes which lambed. Those figures show that there were 51 more barren ewes per 100 2-tooths with very covered faces than per 100 2-tooths with open faces.

The average weaning weights of the lambs from ewes of the different face-cover classes do not show such a big variation, but the lambs from open-faced ewes were heavier at weaning than those from covered-faced ewes. The third line shows that the average weight of lamb weaned per ewe put to the ram is 16.9lb. for ewes with very covered faces and 38.3lb., or more than twice as much, for open-faced ewes.

The three measures of productivity increase regularly from the more covered to the less covered classes, showing that what are really quite small differences in face cover are associated with quite large differences in fertility.

face cover affects the production of ewes in all age groups, under Ruakura hill country conditions the predominant effect was found on 2-tooths. Estimates from both Massey College and Ruakura indicate that over their lifetime open-faced ewes return at least 6s. per ewe per year more than covered-faced ewes.

There are obviously large differences in production between sheep with different degrees of face cover, but the reason for these differences is not quite so apparent. Wool blindness cannot be the only explanation, because in the results just cited all the sheep requiring it were wigged three times a year. Nor does wool blindness appear to explain the differences in fertility between ewes of the open and slightly covered classes, in neither of which are sheep with any wool round the eyes.

Whether face cover has its effects through interference with the vision of the sheep or whether it is a reflection of some other quite different factor is not at present the important point. If the normal farm practice of wigging does not eliminate the effects of wool cover on the face, what can the farmer do to obtain the enhanced fertility associated with the open-faced condition in sheep? This problem would appear to be answered easily in theory, but perhaps with more difficulty in practice. Just as wool has methodically been bred on to the face of the Romney in the past, it seems now that it must just as methodically be bred off.

Inheritance of Face Cover

With most characters of economic importance in sheep, such as fleece weight and body type, there is only a slow rate of improvement through breeding, because these characteristics are weakly inherited. How strongly is face cover inherited?

Though there are no published data on the strength of inheritance of face cover in New Zealand Romney sheep, there are firm indications that it is strongly inherited. Estimates obtained in the United States show that in the fine-woolled Rambouillet breed face cover is the most strongly inherited character of economic importance. Professor A. L. Rae of Massey College is at present working on the problem and it seems likely that face cover in the Romney breed is at least as strongly inherited as it is in the Rambouillet.

This means that rapid progress can be expected in breeding for the open-faced condition in sheep by the use of straightforward selections for it. The hill country farmer, however, can begin such a programme only when he can procure open-faced rams and these are not readily available in the industry. Most Romney rams bred today have extensive face cover. In fact, since the breed was introduced into New Zealand there has been a steady trend in stud sheep fashions toward increasing rather than decreasing face cover. The first step in the process of reducing face cover in New Zealand Romney sheep must, therefore, be taken by the stud breeder. However, the stud breeders will not breed open-faced rams unless their customers, the hill country farmers, demand them.

Knowledge of the effects of face cover on the fertility of ewes places a powerful selection tool in the hands of the farmer. He can now recognise easily in sheep a strongly inherited character which can markedly affect productivity. It is hoped that the information presented will at least give the hill country farmer food for thought, and it is suggested that his thinking be clear headed, not woolly headed.

EDITOR: A. G. G. HILL

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Grassland Management for Meat Production (F. E. Alder).
Tall Fescue and Lucerne Drills for Winter and Summer Grass (G. Pearson Hughes).
The Ensiling of Lucerne (J. C. Murdoch, D. A. Balch, A. S. Foot and S. J. Rowland).
The Establishment, Growth and Yield of Ultra-Simple Grass Seeds—Part II. (R. G. Heddle, J. B. D. Herriott).
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The Home Garden in January

GROWTH in most gardens is still vigorous in January and holiday-makers returning home late in the month are often amazed at the development of plants in their gardens. Weeds that were insignificant in December are ripening seed; crop plants that were well established are passing their best and others that were in the seedling stage in December are nearing maturity. Weed control, attention to vegetables for winter supply, and sowing of successional crops to mature in autumn are usually first priority jobs in the home garden in January. In this article A. G. Kennelly, Horticultural Instructor, Department of Agriculture, Dunedin, discusses work in the home garden in January.

THE hoe should be used often in January, because weeds are easily killed with it in the dry conditions which are usual then. Tomatoes should be pruned regularly and tied as they develop and those in the more humid districts should be sprayed with bordeaux mixture or suitable Government-certified substitute against fungous diseases. Successional sowings of salad vegetables should be made and celery and winter greens such as borecole (kale), broccoli, brussels sprouts, savoy cabbage, and leeks should be set out.

All members of the cabbage family should be sprayed or dusted to protect them against the caterpillars of the diamond-backed moth or white butterfly or against aphides. Potatoes should be earthed up and in northern districts sprayed with bordeaux to prevent an attack of late blight. Ground that will not be required for some time should be sown with a cover crop so that plant foods are less likely to be leached out and the organic matter and tilth maintained.

The runners of kumaras should be lifted periodically to prevent their rooting and asparagus beds should be kept free from weeds. Liquid manure can be applied where needed and watering may be necessary where conditions are excessively dry. January provides the last opportunity in most districts for sowing peas, dwarf beans, and carrots to mature before winter. Often the difficulty in small gardens is to find the space to make these sowings and winter plantings as well.

By mid-January most home gardens are filled with such vegetables as dwarf and climbing beans, carrots, potatoes, shallots, peas, spinach, turnips, lettuce, radish, and the various kinds of beet, all of which are easily grown for harvesting at this time of year. Pumpkins, marrows, cucumbers, and, toward the end of the month, outside tomatoes and sweet corn should also be ready for harvesting in most districts. Because winter greens mature when vegetables are more likely to be scarce and dear and there is a special need for them for the vitamins they contain, it is advisable, if a choice must be made owing to lack of space, to give them preference over summer and autumn crops.

Beans

Dwarf or french beans can now be sown for late autumn use. In most southern districts it is advisable to sow in the earlier part of January; the measure of success obtained usually depends largely on favourable autumn weather. In the more favourable districts, particularly in the north, February sowings of quick-maturing

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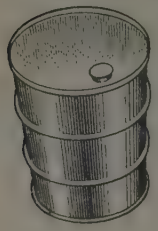

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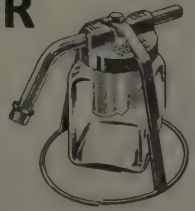

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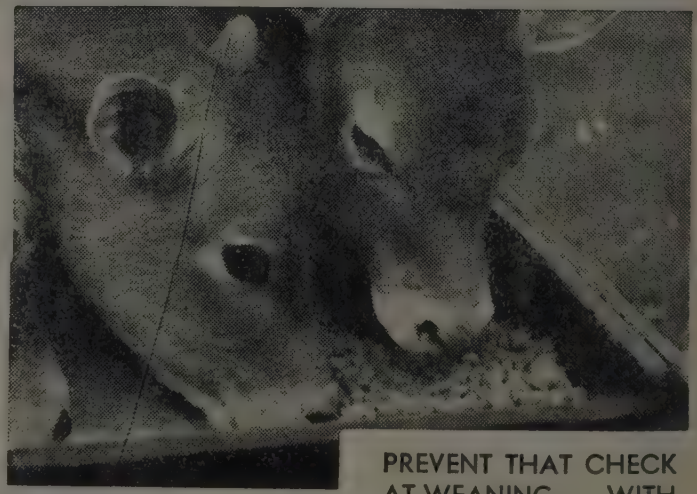

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varieties often do well. Grown under good conditions dwarf beans come into bearing in about 8 to 10 weeks.

Late January sowing in most districts should be in warm, sheltered situations, for even relatively light frosts stop the development of beans. Though beans grow in a fairly wide range of soils, they need a constant moisture supply. The soil should be well worked before sowing and a friable, well-drained loam, reasonably supplied with organic matter suits the crop well.

On poorly drained soils plants become yellow, due to death of some of the roots and consequently are weakened, particularly if the weather is wet or if they are frequently irrigated. Flowers of beans grown where temperature changes are sudden or on soils that dry out rapidly frequently drop off or fail to set or the young pods become malformed; they may curl or hook or even wither and die.

Beans are not usually regarded as gross feeders, and generally on reasonably fertile soils only moderate fertiliser applications are necessary. On many of the richer soils that are well supplied with nitrogen, dressings of superphosphate alone at about 2oz. to a square yard may give satisfactory results, though on poorer soils a complete fertiliser is usually advisable. As beans are not deep rooted water should be given if conditions are dry, as otherwise the plants may be slow in developing.

Seed is best sown about 2in. deep in the bottom of a trench taken out with a hoe about 2in. deep. January sowings in dry weather should preferably be made a little deeper than early sowings. Rows should be 24in. to 30in. wide. Good varieties include The Prince and Tendergreen.

Carrots

Carrots are high yielding and usually easy to grow where the soil is fertile, but to obtain a succession in most districts several sowings have to be made. The housewife usually prefers young, medium-sized carrots, though it has been proved that grown under the same conditions, large carrots contain as much sugar and usually no more fibre proportionally than small ones, though there is considerable variation in the quality of different varieties of carrots.

In most districts January is the latest that seed can be sown to produce a crop before winter and in the colder southern districts December sowing is often preferred. Late autumn (March or April) sowing to provide carrots for spring use is not advisable where winter conditions are cold enough to check growth severely. Even in favourable northern districts raised beds are usually an advantage at that time and a warm, sunny situation is necessary. In general, late autumn sowing in most districts is rather risky and to ensure a continuous supply of roots throughout the year reliance should be placed on early spring and summer sowings.

Seedling plants of vegetables for winter use such as leeks, savoy cabbage, kale, broccoli or winter cauliflower, and brussels sprouts can be set out in most districts in January.

Types

Carrots are available in great range of sizes and shapes and in shades of colour from yellowish white to deep orange-red. The stump-rooted or intermediate types are usually preferred, as they are easily dug yet large enough for convenient handling without being wasteful in preparation for the table. Short varieties are usually grown mainly for early or very late crops. They are also usually regarded as being especially suited to very shallow soils and to heavy, retentive soils where pulling is difficult. The long varieties are usually much more difficult to dig, but when established are likely to be better adapted to dry conditions, as the fleshy part of the taproot is in the cooler, moist soil of the lower levels, though the fibrous feeding roots of both types range deeply.

Seed should be sown about ½in. deep in rows 12in. to 15in. apart. In light or free-working soil thinning of most varieties is unnecessary if the seed is sown thinly. In heavier soils which tend to compact, or if large roots are grown, plants can be thinned to 2in. to 4in. apart. Good varieties include Taranaki Strong Top and Red Cored Chantenay.

Crops for Winter and Spring Use

The main or late crop or a successional planting of celery can now be made as advised in the October "Journal". Late autumn or winter greens such as broccoli (winter cauliflower), brussels sprouts, kale, savoy cabbage, and leeks should also be set out by the end of the month, though planting may be delayed a little longer in favoured situations where the autumn is mild enough to permit the plants to develop before winter checks growth. Though their capacity for withstanding dry conditions varies a good deal (celery, for instance, must be kept reasonably moist, but kale will withstand some dryness), adequate moisture is essential for good growth and fine quality in all these crops.

Celeriac

Celeriac or turnip-rooted celery is a good substitute for celery and takes less time and much less trouble to grow. It has a turnip-like root with a characteristic celery flavour. The roots mainly are used, they may be boiled, used in stews, or sliced and eaten raw as a substitute for celery

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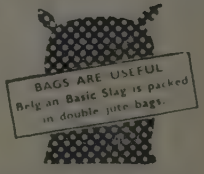

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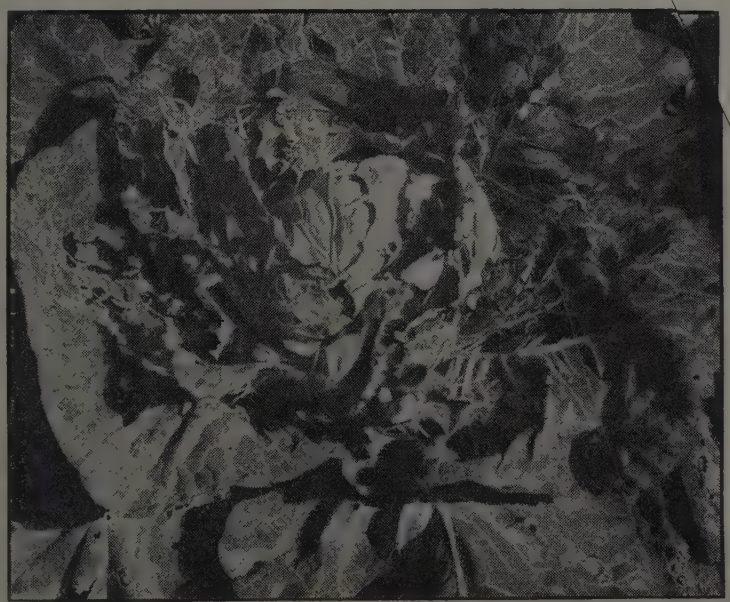
Plants may be set out now, but as celeriac is not as well known as celery, few seedsmen sell plants, though most sell seed. Because it is very hardy, does not require to be blanched, and succeeds on a wide range of rich, moist, well-drained soils, celeriac deserves to be more extensively grown by home gardeners who have a liking for the flavour of celery. Seed is usually sown ⅛in. to ¼in. deep in rows 15in. apart when the ground has warmed in late September or October, though a sowing can be made in January where conditions are favourable. Plants can now be thinned to or set out 6in. to 8in. apart in rows 18in. apart.

Plants should not be set out deeply and should be liberally watered in dry weather. In very dry situations plants should be set out in shallow trenches to facilitate watering. Plants should be set out in a rich soil so that they make vigorous, continuous growth. During cultivation side shoots should be removed and the soil dragged away from the bulbous root, which should be kept trimmed of all suckers, as they tend to detract from its shapely development.

In districts which experience repeated severe frosts the roots can be lightly earthed up in autumn for protection, but lifting and storing are unnecessary except in heavy, poorly drained soil in exposed situations. Varieties include Celeriac and Giant Smooth Prague.

Peas are a popular vegetable in most households. A successional sowing in January should provide supplies in autumn.



Cabbage badly damaged by caterpillars of the white butterfly and diamond-backed moth. These caterpillars can be controlled readily by spraying or dusting with DDT.

Lettuce

Where a succession of lettuce is desired seed in January is best sown in the situation where the crop is to mature. Though lettuce, like such subjects as cabbage, beets, and tomato, transplants readily, its ability to withstand transplanting depends on several factors. In such plants damaged and destroyed roots are normally replaced quickly by new growth, but this depends on the ability of the roots to absorb water readily, and the relative ability to absorb water depends in turn on the amount of suberin or cork covering on the roots; the thicker or more distinct the covering is the slower the absorption will be. Other factors such as the reserve of food in the plant are, however, also likely to be important. In January, when conditions are very dry, the check of transplanting, even if the work is done with the greatest care, is likely to be so severe that sowing in the place where the plants are to mature is preferable.

Lettuce thrives in cool, moist, well-drained soils and should be grown quickly or it tends to be tough and bitter. Seed should be sown thinly ¼in. deep in rows 12in. apart. The soil should be cultivated to a very fine tilth and it should be rich in organic matter.

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2. See that the jaws of your strainer are not nicking too deeply.
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Good varieties for districts where conditions are hot include Great Lakes and Imperial 456. Where summer heat is more moderate almost any of the popular summer varieties, for example, Neapolitan (New York, Webbs Wonderful) or Success, are likely to give a satisfactory crop.

Onions

Weed control is particularly important where onions have not yet reached maturity. Weeds not only use up available plant food but when conditions are damp tend to create an environment unfavourable to the ripening of the bulbs. Though many onion crops are ready for harvesting in January, those that were planted late or are still growing well should be kept free of weeds and pests and diseases to induce them to grow to maximum size.

Peas

In most districts January is the latest month for sowing peas which will mature before winter. In the cooler districts a quick-maturing variety should be chosen and in most southern districts it is advisable to sow early in the month. Peas thrive in cool but not cold conditions, and a moist, deeply cultivated, well-drained soil containing adequate humus is best.

Soil preparation should be thorough. The ground should be deeply dug and where necessary organic material such as compost or farmyard manure should be incorporated, preferably some time before sowing, though peas usually do best following a crop that was well manured with organic and inorganic manure. The addition of superphosphate at 1oz. to 2oz. per square yard has proved beneficial on many of the heavier soils that have been kept in good condition by adequate manuring with organic material or by the digging in of green crops, but on the lighter soils a complete fertiliser is likely to give better results. Only moderate fertiliser applications are advised on soils in reasonably good condition. Too-heavy manuring, particularly with nitrogenous organic manures, tends to promote excessive vegetative or straw growth and makes the crop more liable to disease.

Lime is essential on most soils and can be supplied by an annual dressing of 3oz. to 4oz. of carbonate of lime per square yard.

Seed Sowing

Seed should be sown in V-shaped or broad, flat drills usually drawn out with the hoe. Drills should be 2in. to 3in. deep, except where conditions are hot and dry, when they should be considerably deeper so that, though the seed should not be covered with more than 2in. of soil, the roots will be well down in the cooler and moister soil of the lower levels. This is very important where conditions are dry or where heavy wind is likely, as the plants can to some extent be gradually earthed up the stems as they develop. Dwarf varieties should require no other support.

Sweet corn is usually regarded as a warm-climate vegetable, but it succeeds in most of the colder districts of New Zealand.

Protection of newly emerged peas against birds is essential in some districts, though birds are mainly troublesome in early spring, when food is scarce and is lacking in variety. Pea guards made of wire netting are most effective, provided the ends are blocked, but they should be removed before the peas become entangled in the wire. There are numerous other methods of protection, but their effectiveness depends on thoroughness of application and other factors. Spraying with bitter substances such as an infusion of alum or quassia in water (with soap as a spreader) or dusting the rows with sawdust, lime, sulphur, or superphosphate gives varying degrees of protection. Cotton stretched over the shoots is also effective if a number of strands, which may be criss-crossed or stretched in parallel lines, are used.

Varieties

Most seed catalogues give a list of varieties with heights and the approximate number of days each variety requires to mature. Popular varieties include the quicker-maturing varieties Little Marvel and William Massey and the intermediate varieties Victory Freezer, Green Crop, and Greenfeast.

Shallots

The food value of the shallot is stated to be not less than that of the onion, and considering the simplicity

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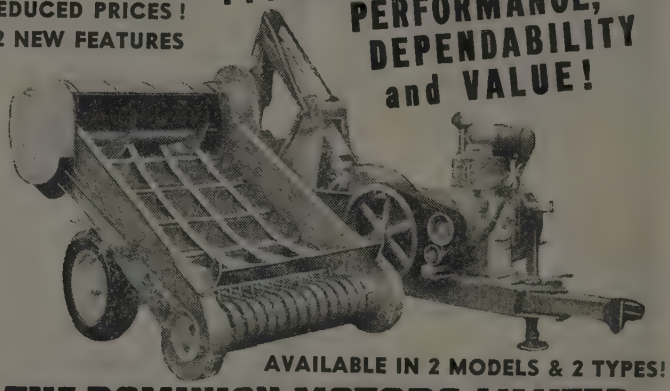

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of its culture it is rather surprising that it is not more commonly grown in New Zealand. Most crops have attained optimum development by January and water should then be withheld and the bulbs permitted to dry off.

If shallots are carefully harvested when properly dry and then stored in a cool place, they should keep until the following spring. Proper drying and sorting over of the bulbs before storage are important. Bulbs that have been fed with excessive quantities of nitrogenous manures are difficult to harden off and should be kept for short storage; damaged bulbs should be used at once or destroyed.

Sweet Corn

Sweet corn bears separate male and female flowers, the tassel being the male inflorescence and the ear the female. Pollination normally takes place as soon as the silks appear and development of the cob should be rapid thereafter; the edible stage is usually reached 2 to 4 weeks later according to temperature, usually when the tassel has just withered. Maturity is commonly tested by thumbnail pressure. The young grains are first watery inside, then milky, then doughy, and finally the "dent" stage is reached, when the grains are too hard to be palatable.

Cobs should be harvested with a gentle jerk or cut with a sharp knife when the milky part of the grain is beginning to thicken but is still milky. In very exposed situations it is advisable to stake sweet corn, but in most situations earthing up of the stems will provide all the support necessary. Suckers often develop, but there is no evidence that their removal promotes earliness or increases the number or weight of the ears on the stem.

Swedes and Turnips

In northern districts where conditions are not too dry and a reasonably long growing season is assured seed of swede turnips can still be sown as advised in the October "Journal". Swedes are high yielding and usually considered richer in plant food than ordinary turnips and are especially useful during winter. To be of good quality turnips, like radish, should be grown quickly. Soil for them should be well drained but moist and rich in humus and cultivated to a fine tilth. The crop can be grown on most garden soils, but a light loam is preferable. Superphosphate has given good results on many agricultural soils, though a complete fertiliser is likely to be most satisfactory on many of the less fertile, well-worked home garden soils.

In most southern districts or in areas where adequate soil moisture can be maintained January is a good time to sow turnips. Elsewhere sowing is often delayed until cooler or more moist conditions are assured. Good varieties include Purple Top, White Milan, Purple Prince, and Golden Ball. A variety such as Golden Ball is often chosen for December to March sowing, because yellow varieties usually stand longer under adverse conditions than the white sorts. Seed should be sown thinly ½in. deep in rows 12in. apart and plants later thinned to 3in. to 4in. apart.

All photographs by Green and Hahn.

Agricultural and Pastoral Show Dates

THE following are dates and venues of A. and P. shows up to the end of April:—

NORTH ISLAND

January

2 January—Nuhaka A. and P. at Nuhaka.

13 and 14 January—Wairoa County A. and P. at Wairoa.

20 and 21 January—Feilding I., A., and P. at Feilding.

21 January—Central Hawke's Bay A. and P. at Waipukurau.

*21 January—Whangaroa A. and P. at Kaeo.

27 and 28 January—Horowhenua A. and P. at Levin.

27 and 28 January—Rotorua A. and P. at Rotorua.

28 January—North Kaipara A. and P. at Paparoa.

*30 January—North Hokianga A. and P. at Broadwood.

February

1 February—Marton A. and P. at Marton.

3 and 4 February—Rodney A. and P. at Warkworth.

4 February—Rangitikei A. and P. at Taihape.

7 and 8 February—Dannevirke District A. and P. at Dannevirke.

10 February—Dannevirke Ram Fair at Dannevirke.

10 and 11 February—Taumarunui and District A. and P. at Taumarunui.

10 and 11 February—Taranaki A. and P. at New Plymouth.

11 February—Hukerenui A. and P. at Hukerenui.

11 February—Pahiatua A. and P. at Pahiatua.

*11 February—Galatea A. and P. at Galatea.

15 February—Te Awamutu A., P., and H. at Te Awamutu.

17 and 18 February—Ohura A., P., H., and I. at Nihoniho.

17 and 18 February—Franklin A. and P. at Pukekohe.

17 and 18 February—Masterton A. and P. at Masterton.

18 February—Northern Wairoa A. and P. at Mititai.

*18 February—Tauranga A. and P. at Tauranga.

*21 February—Otorohanga A. and P. at Otorohanga.

23 February—Matamata A. and P. at Matamata.

24 and 25 February—Wellington and Hutt Valley A. and P. at Trentham.

24 and 25 February—Te Kuiti and District A. and P. at Te Kuiti.

25 February—Te Puke A. and P. at Paengaroa.

25 February—Putaruru District A. and P. at Putaruru.

March

*3 March—Whakatane A. and P. at Whakatane.

3 March—Waiotira Junction A. and P. at Waiotira.

3 March—Mangonui County A. and P. at Kaitaia.

3 March—Albany A. and P. at Albany.

3 March—Waikato Central A. and P. at Cambridge.

*7 March—Morrinsville A. and P. at Morrinsville.

7 March—Opotiki A. and P. at Opotiki.

10 March—Kumeu District A. and H. at Kumeu.

10 March—Hawke's Bay A. and P. at Hastings.

*17 March—Wellsford A. and P. at Wellsford.

SOUTH ISLAND

January

14 January—Blueskin A. and P. at Waitati.

21 January—Peninsula H. and P. at Duvauchelle.

21 January—Waikouaiti A. and P. at Waikouaiti.

*21 January—Wallace A. and P. at Otautau.

28 January—Palmerston and Waihemo A. and P. at Palmerston.

28 January—Waiau A. and P. at Tuatapere.

February

2 and 3 February—Otago A. and P. at Dunedin.

11 February—Golden Bay A. and P. at Takaka.

*12 February—Inangahua A. and P. at Inangahua.

18 February—Banks Peninsula A. and P. at Little River.

18 February—Murchison A. and P. at Murchison.

*18 February—Central Otago A. and P. at Omakau.

*25 February—Kaikoura A. and P. at Kaikoura.

25 February—Maniototo A. and P. at Ranfurly.

March

3 March—Amuri A. and P. at Rotherham.

3 March—Temuka and Geraldine A. and P. at Winchester.

10 March—Cheviot A. and P. at Cheviot.

10 March—Mt. Benger A. and P. at Roxburgh.

*13 March—Lake County A. and P. at Arrowtown.

17 March—Hawarden A. and P. at Hawarden.

17 March—Mayfield A. and P. at Mayfield.

17 March—Upper Clutha A. and P. at Wanaka.

*24 March—Methven A. and P. at Methven.

April

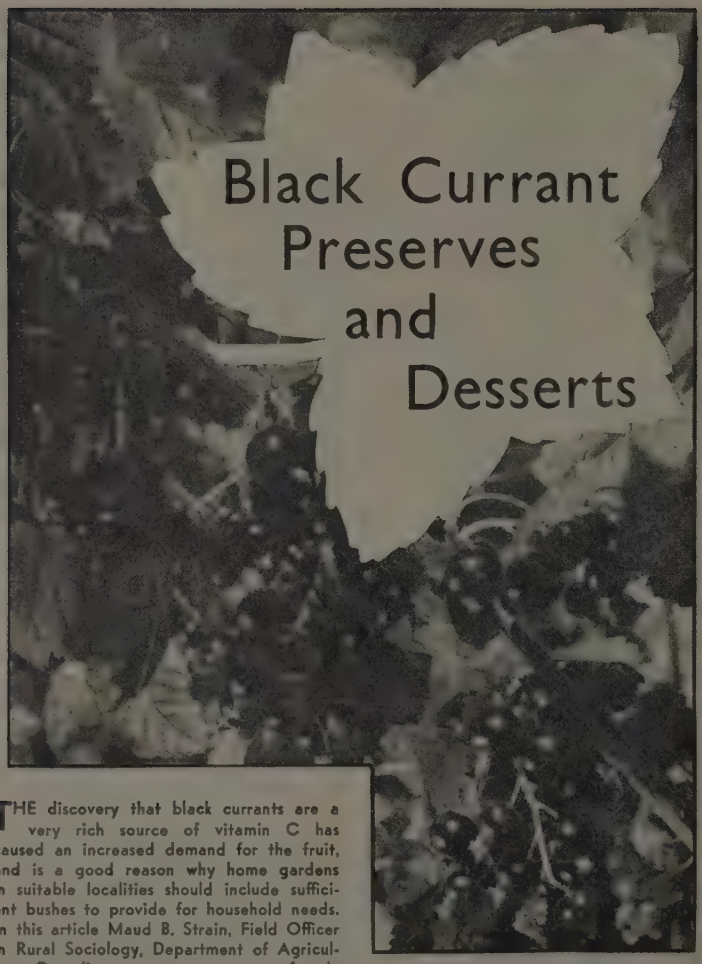
2 April—Mackenzie County A. and P. at Fairlie.

2 April—Strath-Taieri A. and P. at Middlemarch.

7 April—Oxford A. and P. at Oxford.

11 April—Malvern A. and P. at Sheffield.

* The Department of Agriculture exhibit will be staged at this show.



Black Currant Preserves and Desserts

[*National Publicity*

THE discovery that black currants are a very rich source of vitamin C has caused an increased demand for the fruit, and is a good reason why home gardens in suitable localities should include sufficient bushes to provide for household needs. In this article Maud B. Strain, Field Officer in Rural Sociology, Department of Agriculture, Dunedin, suggests some ways of making use of the black currant crop.

CURRANTS prefer a cool climate. Up to a dozen bushes in a corner of the vegetable garden should meet the needs of an average family. The fruit may be eaten raw, but is usually made into jam, jelly, pies, puddings, bottled fruit, fruit syrup, or wine. Weight for weight currants contain an appreciably greater amount of vitamin C than citrus fruit, which is so often regarded as the fruit richest in this anti-scorbutic vitamin.

The use of black currant or citrus drinks in the treatment of colds and other feverish conditions is supported by medical facts. It has been shown that when the temperature of the body is raised vitamin C appears to be used up, probably in helping to fight infection; hence the necessity of supplying larger quantities to maintain the vitamin C content of the blood.

Unlike the citrus family, black, red, and white currants are highly perishable and difficult to transport; this explains partly why they are not readily available during the season over a widespread area as are oranges. The harvesting season is usually only about 4 weeks from mid-December to mid-January. Fortunately black currants are easily and economically preserved, and results of reported experiments indicate that preserving and cooking destroy only an insignificant proportion of the vitamin C.

As copper readily destroys vitamin C, harvesting and cooking processes should not be carried out in copper or brass preserving pans. One average serving of cooked black currants will provide sufficient vitamin C for an adult's daily requirements.

Black currants are rich in pectin and acid; this means that jams and jellies made from black currants will set readily and that the bottled fruit will keep well. Black currants are often used in combination with other fruits which have little colour or flavour of their own, for example, some varieties of apples, but the apple serves only as a diluent and the predominating flavour and colour will invariably be of black currant, toned down but unmistakable.

Black Currant Jam

Black currants are treated differently from any other fruit in jam making, because they are very rich in pectin and they have tough skins. The proportions for jam are unusual. To every 1lb. of fruit 1 pint of water and 2lb. of sugar are added.

Pick over the fruit, removing the stalks, and wash it. Put it with the water into a pan and bring it to boiling point and simmer gently until tender (about 20 minutes). Add the sugar and stir until it is dissolved. Then boil briskly until the jam sets on testing (10 to 20 minutes). Allow the jam to cool slightly before bottling (as this will give a more even distribution of fruit in the jelly) in clean, warmed jars. Cover when cold.

Black Currant Jelly

Take a convenient quantity of black currants, say 4lb., wash them, and remove any leaves. Put the currants in a preserving pan and cover with water (about 3 pints). Boil them gently until the skins are soft and the fruit is broken up. Strain the fruit through a jelly bag and add sugar to the juice in the proportion of 1lb. of sugar to each pint of juice. Boil rapidly until a little tried on a cold plate sets (5 to 10 minutes). Pour into clean, warmed jelly jars and cover.

To make the black currants go further apple peelings and cores and/or gooseberries can be added and boiled up together; put the fruits through a jelly bag and to each pint of extract add 1lb. of sugar and boil until it jellies. In the resultant jelly the only recognisable flavour will be black currant. This jelly is the equal of red currant as an accompaniment for either hot or cold roast mutton, and as a garnish for a sweet it can add a touch of brightness and individuality to an otherwise unremarkable dessert.

Black Currant Jelly (Quick Method)

2lb. of sugar — 2lb. of prepared black currants
½ pint of water

Boil the sugar and water until the syrup can be spun into a thread (about 10 minutes). Put the cleaned and picked-over currants into the syrup. (It is advisable to use a saucepan large enough for the syrup to bubble up without boiling over.) The mixture will boil up and rise in the saucepan. Let it boil in this way for

a few seconds; then strain through a large gravy strainer into a large, heated jug. Pour into clean, heated jelly jars and cover.

Bottled Black Currants

Black currants may be preserved in syrup, in water, or in their own juice. Bottling in water only, where the washed and picked-over currants are placed in jars and processed in a water bath, is more economical and the skins become softer. Sugar added before the skins have been cooked tends to toughen the skins.

Bottling in Boiling Water or Syrup

Remove the stalks from the currants, wash them, and pack them in clean, warmed jars. Stand the jars on a folded dry cloth or, preferably, a wooden slatted rack in the bottom of the pan in which they are to be processed. Cover the fruit with hot syrup or boiling water. The level of the contents of the jar should not be less than ½in. from the top of the jar for self-sealing or plastic skin lids.

Seal the jars (which should not be touching each other or the sides of the pan) according to the type of lid being used. Fill the pan with water as hot as the hand can stand, heat it to boiling point, and process until small bubbles appear on the fruit in the jars (about 20 minutes). Remove the jars at once from the water bath and seal again if necessary as follows:—

Zinc tops: Screw tightly and invert.

Glass lids with wire clips: Tighten lower clips and invert.

Self-sealing lids: Do not touch or invert.

Thick preserving plastic: Do not touch or invert.

Bottling in Own Juice

Allow 2oz. of sugar to each pound of fruit and put the prepared fruit and sugar in warmed jars in layers. Fill the jars to within ½in. of the top, lower them gently into a warm-water bath, and process as in the preceding recipe.

Bottled fruit should be stored in a cool, dark, dry place, as sunlight causes foods to fade and destroys vitamins.

Using Bottled Black Currants

Bottled black currants, either by themselves or in combination with other fruit, are suitable for pies, tarts, steamed puddings (where the pudding basin is lined with pastry, filled with fruit, covered with pastry and buttered paper, and steamed for 2½ hours), sponge puddings and similar mixtures. The presence of pastry, sponge crust, or similar accompaniment helps to make the fruit more acceptable to those who find the taste of black currants too tart. When black currants are bottled in water and the sugar is added at the time of use the currants are softer and the tartness is not so pronounced as with the freshly stewed fruit.

Black Currant Juice

Fruit for the preparation of juice must be dead ripe—too ripe for either preserving or making into jam. Juice should be bottled in sterilised bottles with crown seals or corks. New corks should be boiled for 15 minutes or used ones for 1 hour. It is advisable to use bottles of not more than ½ pint capacity, so that once the bottle has been opened the juice will not ferment before it can be used. Bottles should be sealed finally by having the corks and the first inch of the necks dipped in paraffin wax.

Heat and mash about 4lb. of currants in 2 pints of water and cook gently with a lid on until the fruit is tender and well broken up. Press this through a colander or jelly bag (the latter will give a clearer juice, but with lowered vitamin C content). Reheat the liquid and bottle in sterilised bottles, cork, and when cool dip the bottle necks in paraffin wax. Juice can be used later for making jelly or for combining with other fruits when they become available.

Black Currant Syrup

Juice will keep without sugar, but converting juice into syrup by the addition of sugar helps to retain the flavour and makes it ready for use when opened.

Allow 8oz. of sugar to each pint of juice. Add the sugar to the strained juice, stir until the sugar is dissolved, and then boil for 1 minute. Pour into sterilised bottles and cork as directed in the preceding recipe.

Spiced Black Currants

1lb. of currants	¼ teaspoon of ground cinnamon
¼ cup of vinegar	¼ teaspoon of cloves
½ cup of water	¼ teaspoon of allspice
1lb. of sugar	

Remove the berries from the clusters and wash well. Place the fruit, vinegar, water, and sugar in a saucepan. If the spices are added directly, reserve ½ cup of the sugar, mix it with the spices, and stir these in 2 or 3 minutes before cooking of the fruit and other ingredients is finished. If the spices are not added directly to the product, double the amounts given, tie them in a cheesecloth bag, put the bag in the mixture, and remove it at the close of the cooking period. Cook the materials at moderate to rapid boiling rate until the hot product will mound up on the stirring spoon or until a small amount of free syrup will jell when tried on a cold saucer. Put the mixture into clean, warm jars and cover.

Black Currant Drinks

Black currant drinks help in the treatment of colds and other feverish conditions. If no black currant juice

Black currants can be preserved in a variety of ways.

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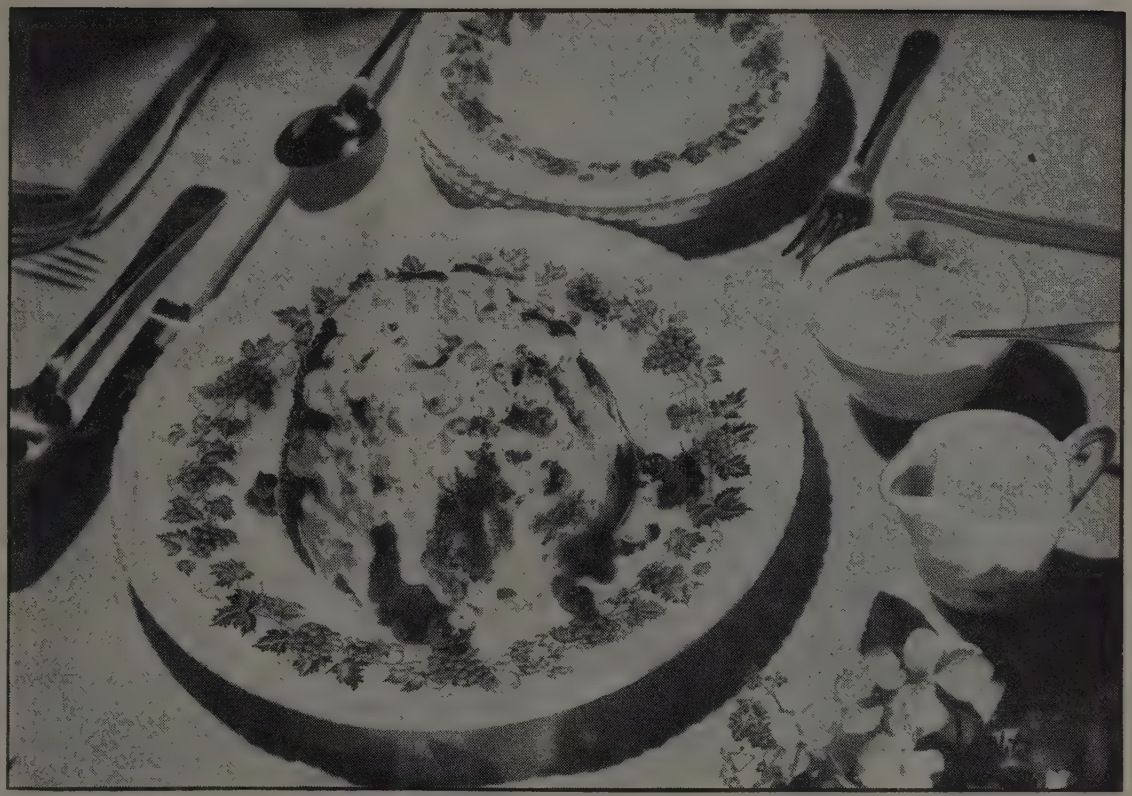

Black cap pudding. This is a light sponge pudding with a thick layer of black currant jam in the bottom. When the pudding is turned out the jam spreads all round the outside surface.

or syrup is available, drinks can be made from jam or jelly as follows:—

1. Pour ½ pint of boiling water on to 1 tablespoon of black currant jelly or jam and stir until the jam or jelly is dissolved. If jam is used, the drink must be strained. The drink can be used either hot or cold.

2. Place a heaped tablespoon of jam, 2 teaspoons of honey, and the grated rind of half a lemon in a jug and mix well with a wooden spoon. Pour into this a breakfast cup of boiling water. Allow the mixture to stand for 15 minutes, strain, bring to boiling point, add the juice of 1 lemon, and serve.

Black Currant Toffee

1 level tablespoon of butter
1lb. of brown sugar
1 dessertspoon of water
1 tablespoon of black currant jelly

Melt the butter in a saucepan over gentle heat, add the sugar and water, and let it boil gently until the sugar has dissolved. Stir in the black currant jelly and boil until a little toffee tested in water is brittle. Pour the toffee into a shallow, well-greased baking tin and let it cool. When it has set but before it becomes hard mark it into squares. Break it when cold.

Black Currant Desserts

St. Ives Pudding

8oz. of flour
2 tablespoons of milk
2 level teaspoons of baking powder
2oz. of dripping
1oz. of sugar
¼ level teaspoon of salt
1 heaped tablespoon of black currant jam
1 egg
Grated rind of ½ lemon

(4 to 6 servings)

Rub the dripping into the flour and add the salt and baking powder and the lemon rind finely grated. Mix these well together. Beat the egg, add the milk, and mix the other ingredients with this liquid. Put the jam in the basin. Place the mixture on top (it should not more than two-thirds fill the basin), cover, and steam for 3 hours. Serve with lemon sauce.

Lemon Sauce

½ pint of milk
1 level teaspoon of cornflour
1oz. of sugar
1 egg
Rind and juice of 1 lemon

Mix the cornflour to a thin paste with a little of the milk. Boil the rest of the milk in the upper portion of a double boiler. Combine the hot milk gradually with the cornflour mixture, return it to the saucepan, and boil for 5 minutes, stirring all the time. Remove it from the heat and stir in the sugar, finely grated lemon rind, and juice. Cool this mixture a little and stir in the yolk of the egg well beaten and then the white whipped stiffly. Stir these over boiling water for 2 to 3 minutes, but do not let the mixture reach boiling point.

Black Cap Pudding

2 eggs
4oz. of sugar
4oz. of flour
4oz. of butter
½ teaspoon of baking powder
2 tablespoons of black currant jam

Cream the butter, add the sugar, and beat them together until light and creamy. Add the well-beaten eggs and lightly stir in the flour sifted with the baking powder. Butter and flour a pudding basin and put the jam on the bottom. Pour in the sponge mixture, cover with buttered paper,

and steam for 1½ to 2 hours. Serve with whipped cream.

Black Currant Trifles

½lb. of ripe black currants
4oz. of castor sugar
Sponge fingers
2 tablespoons of water

Line a glass trifle dish with sponge fingers or strips of sponge cake. Stew the currants in the water until they are soft. Add the sugar and cook a few minutes longer, strain off the juice, and pass the fruit through a sieve. Put a layer of this pulp on the sponge fingers, cover this with more sponge fingers, and pour the syrup over them. Allow the trifle to stand until thoroughly cold. Before serving pile whipped cream on top and decorate with ripe black currants.

Black Currant Sponge Pudding

1 quart jar of bottled black currant or 1½lb. of fresh fruit
1 egg
5oz. of sugar
2oz. of butter (melted)
5oz. of flour
½ pint of milk
½ teaspoon of baking powder

(6 servings)

Strain the liquid from the black currants. Put them in a piedish with sugar to taste and put them in the oven to heat through. Beat the egg well, add the sugar, and beat until thick and creamy. Add the melted butter and beat again. Sieve the flour and baking powder and add it alternately with the milk. Pour this mixture over the hot fruit and bake in a moderate oven (350 degrees F.) for 1 hour.

Black Currant Cream

½ pint from the liquid strained from the bottled black currants in the previous recipe
1 dessertspoon of gelatine
¼ pint of water
6oz. of sugar
½ pint of cream (whipped)

Soften the gelatine in the water for 10 minutes. Heat the liquid from the black currants and add it to the gelatine mixture. When the gelatine has dissolved add the sugar and stir until the sugar is dissolved. Allow this mixture to cool and when it shows signs of starting to thicken add the stiffly whipped cream. Pour the mixture into a mould to set.

Amethyst Jelly

1lb. of ripe black currants
1 pint of water
4oz. of sugar
2 level tablespoons of cornflour

(4 servings)

Stew the black currants in the water until they are soft, add the sugar, and stir until it is dissolved. Strain off the liquid and rub the fruit through a sieve. Use a little of the cooled liquid to mix the cornflour smoothly, add the remainder of the liquid and the puree, and boil for 8 minutes, stirring constantly. Turn into a wet mould to set. Unmould and serve with boiled custard made from 1 egg, 3oz. of sugar, and ½ pint of milk beaten together and heated in a double saucepan until the mixture coats the back of a wooden stirring spoon.

Black Currant Cheese Cakes

Line patty pans with thinly rolled short pastry. In the bottom of each place ½ teaspoon of black currant jam. On top of this put a cake mixture made from the following recipe:—

1 egg
2oz. of flour
2oz. of butter
2oz. of sugar
Few drops of almond essence
½ level teaspoon of baking powder

Cream the butter, add the sugar, and beat them well together. Add the almond essence, the egg well beaten, and by degrees the flour sifted with the baking powder. Put a teaspoon of this mixture on top of the jam in each patty pan and bake for 20 to 30 minutes in a hot oven (400 degrees F.).

Dainty Bedjacket in Hairpin Work

A CHARMING, dainty bedjacket which would be a welcome addition to any woman's wardrobe can be made of loops of thick sports wool joined and edged with white rayon yarn. Directions for making the bedjacket, which is illustrated here, are given below.

ABBREVIATIONS: Ch., chain; d.c., double crochet; rep., repeat.

Materials: 3oz. thick sports wool in pale blue; 1oz. thick sports wool in white; 1oz. white rayon yarn for joining and edging; a hairpin crochet prong, size 2 (over-all width 2¼in.); a No. 10 crochet hook; 2yds. of ribbon.

Measurements: Length, 40in.; width, 18in.

The strips: Make 3 white strips with 156 pairs of loops and 3 blue strips with 348 pairs of loops.

Edging for white strips: With rayon, make a loop on hook, pick up loops along one side of strip, draw a stitch through, and make 1 d.c., * 2 ch., pick up next 2 loops, make 1 d.c. Rep. from * to end. Turn and work along the short end with 4 ch., 1 d.c. in centre knot, 4 ch., then continue along the other side to end. Make 4 ch., 1 d.c. in centre knot, 4 ch., slip stitch where you began.

Joining a blue strip round a white one: With rayon, make a loop on hook, pick up 2 blue loops, make 1 d.c., 1 ch., then 1 d.c. in the 2 ch. of white strip, * 1 ch., 1 d.c. in next 2 blue loops, 1 ch., 1 d.c. in the next 2 ch. of white strip. Rep. from * to end of white strip. Continue round the end working 2 blue loops with 1 d.c. into each of the 9 white stitches. Put no chain between these d.c. Work down the opposite side to the end, working the remaining 18 loops round the corner as before. Join the ends of the blue strip at the knot edge.

There are now 3 two-coloured strips with rounded ends. Place two blue edges together, count 10 double loops from the centre of the round end, pick up next 2 loops with rayon, make 1 d.c. on first edge, * 1 ch., 1 d.c. into 2 loops on opposite edge, 1 ch., 1 d.c. into 2 loops on first edge. Rep. from * to within 10 double loops of end. Fasten off.

Outer edge: Work picots all round in rayon, thus: 1 d.c. into 2 loops, * 5 ch., slip stitch into 2nd ch. from hook, 1 ch., 1 d.c. into next 2 loops. Rep. from *. Fasten off. Join all ends neatly and press lightly.

Stitch 2 lengths of ribbon each about 12in. in from ends of one long side edge. These tie at neck. Stitch 2 lengths along opposite edge, each about 4in. in from edges and another length at each side edge between first and second strip join. These tie to form sleeves.

Swim Suit for Girl of 5 to 6 Years

CHILDREN like swim suits which are colourful and allow freedom of movement, and such a suit, in two colours and suitable for a girl of 5 to 6 years, can be made with the pattern given here.

ABBREVIATIONS: K., knit; p., purl; st., stitch(es); rep., repeat; tog., together; sl., slip; p.s.s.o., pass slip st. over; dec., decrease(ing); inc., increase(ing); md., medium; lt., light; st.st., stocking stitch (1 row k., 1 row p.); cont., continue; beg., beginning.

Materials: 2oz. of 3-ply knitting wool in medium colour; 1oz. of the same wool in a light colour; two No. 10 and two No. 12 knitting needles; 2 buttons.

Measurements: Shoulder to crutch, 16½in.; all round at widest part, 24in. (unstretched).

Tension: 7½ st. to 1in.

The Front

Begin at gusset. With No. 10 needles and md. wool cast on 25 st., and shape thus:—

1st row: K. to end.

2nd row: P. to end.

3rd row: K. 1, sl. 1, k. 1, p.s.s.o., k. to last 3 st., k. 2 tog., k. 1.

4th row: Cast on 5, p. to end, cast on 5.

5th row: K. 6, sl. 1, k. 1, p.s.s.o., k. to last 8 st., k. 2 tog., k. 6.

6th row: As 4th row.

7th row: K. to gusset stitches, k. 1, sl. 1, k. 1, p.s.s.o., k. to last 3 st. of gusset, k. 2 tog., k. to end.

8th row: As 4th row.

Rep. the last 2 rows 6 times more (97 st.).

Next row: K. 46, sl. 1, k. 1, p.s.s.o., k. 1, k. 2 tog., k. 46.

Next and alternate row: P.

Next row: K. 46, sl. 1, k. 2 tog., p.s.s.o., k. 46.

Next row: K. 45, sl. 1, k. 2 tog., p.s.s.o., k. 45 (91 st.).

Work 3 rows in st.st., across all stitches, then cont. shaping thus:—

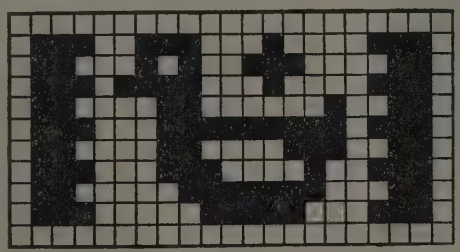

Chart No. 1

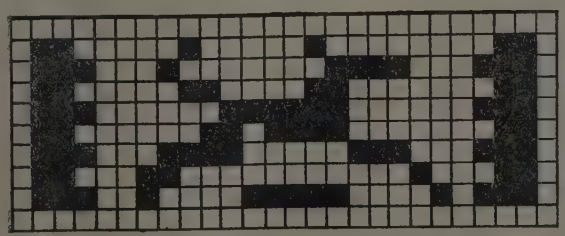

Chart No. 2

Next row: K. 43, sl. 1, k. 1, p.s.s.o., k. 1, k. 2 tog., k. 43.

Work 7 rows straight in st.st.

Next row: K. to 2 st. before centre st., sl. 1, k. 1, p.s.s.o., k. 1, k. 2 tog., k. to end.

Rep. the last 8 rows 4 times more (79 st.). Cont. straight until work measures 7½in. from cast-on edge, ending with a p. row. Change to No. 12 needles and work 1½in. in k. 1, p. 1 rib, ending with a row on wrong side of work.

Next row: Cast off 10 in rib, rib to last 10 st., cast off 10in. rib. Rejoin md. wool to remaining 59 st. Change to No. 10 needles and k. 1 row.

Now begin working two-colour bib.

1st row: P. 3 md., * 1 lt., 1 md. Rep. from * to last 2 st., 2 md.

2nd row: K. 2 md., with lt. k. to last 2 st., 2 md.

Now work from chart No. 1, working stitches 1 to 3 and 57 to 59 at beg. and end of rows only and repeating stitches 4 to 16 four times across remaining stitches with 1 extra st. on lt. between 2nd and 3rd rep. Knit even-numbered rows reading chart from right to left, and purl odd-numbered rows reading chart from left to right. Thus the first 2 rows will be:—

1st row of chart No. 1: P. 3 md., * 5 lt., 5 md., 3 lt. *. Rep. from * to * once, 1 lt. Rep. from * to * twice, 3 md.

2nd row of chart No. 1: K. 2 md., 1 lt., * 2 lt., 7 md., 4 lt. *. Rep. from * to * once, 1 lt. Rep. from * to * twice, 1 lt., 2 md.

Cont. thus until the 9 rows of the chart have been completed. Now work 2nd row as given at beginning of bib, then 1st row.

14th row: With md., work to end.

15th and 16th rows: Rep. 1st and 2nd rows.

Now work the 8 rows of chart No. 2, working as given for chart No. 1 but rep. stitches 4 to 21 three times only across row between first and last 3 st.

25th row: P. 3 md., with lt. work to last 3 st., 3 md.

26th row: K. 2 md., * 1 lt., 1 md. Rep. from * to last st., 1 md.

27th row: As 14th row.

28th row: As 26th row.

29th row: As 25th row.

Now work the 9 rows of chart No. 1 once again, but this time k. odd-numbered rows reading chart from right to left, and p. even-numbered rows reading chart from left to right.

39th and 40th rows: As 25th and 26th rows.

41st row: As 14th row. Break off lt. wool.

Work ¾in. in rib across all stitches.

Next row: Rib 13, cast off 33 st. in rib, rib to end.

Cont. in rib on the last set of 13 st. for 11in. (or length required).

Make a buttonhole in next 2 rows thus:—

Next row: Rib 5, cast off 3, rib to end.

Next row: Rib 5, cast on 3, rib to end.

Cont. in rib, dec. 1 st. at each end of every row until 3 st. remain. K. 3 tog., fasten off. Rejoin md. wool to remaining 13 st. and work to match first strap.

The Back

Work the back exactly as for the front until the work measures 7½in. from the cast-on edge, ending with a p. row (79 st.).

Back Shaping

Next 2 rows: Work to last 6 st., turn.

Next 2 rows: Work to last 12 st., turn.

Cont. thus, working 6 st. less on every row until there are 19 st. only at centre of work. Work to end of row. Change to No. 12 needles and work 1½in. in k. 1, p. 1 rib. Cast off in rib.

To Make up

Press work with a hot iron over a damp cloth. Join the side seams. Now work the leg ribbing thus: With the right side of the work facing and using No. 12 needles and md. wool pick up and k. 96 st. evenly along the shaped leg edge. Work ¾in. in k. 1, p. 1 rib. Cast off in rib. Work along the second leg edge in the same way. Join the leg border and the gusset seams. Sew the buttons to the back waist ribbing. Cross the straps at back. Press the seams.

Salads with Oil and Vinegar Dressing

THERE is no simpler salad dressing than the salad oil and vinegar dressing which has been popular overseas for many years and is gaining favour in New Zealand. Hints on making this type of dressing and suggestions for a number of salads with which it combines effectively are given in this article.

THE dressing is prepared and incorporated in salads as follows:—

Mix a pinch of salt in a dessertspoon of vinegar, sprinkle it over the salad, and toss gently. Add 3 dessertspoons of oil and turn until the whole is coated. Add a light dusting of pepper and turn once more.

This can be varied by mixing half a saltspoon of mustard and/or the same quantity of sugar with the salt and vinegar. This is best done by making the dry ingredients into a paste with a very little vinegar and then stirring in the rest of the vinegar.

Success in the making of a salad will depend largely on giving attention to the following points:—

1. Each leaf of the salad must be thoroughly coated by being turned carefully in the bowl.

2. There must be no excess of oil and vinegar; 2 or 3 dessertspoons of oil and 1 of vinegar will be found ample for most salads intended for 4 people.

3. The vegetables must be perfectly fresh and the salad must be mixed just before it is to be eaten.

4. The leaves of lettuce and similar plants should be torn lightly with the fingers, not cut with a knife.

5. All vegetables which have been washed must be dried as thoroughly as possible by being shaken in a salad basket or a cloth.

Salad Suggestions

The dressing may be used with any of these combinations:—

Summer Salad

Lettuce, cress, thinly sliced radishes, chopped spring greens, and a sprinkling of finely chopped herbs.

Potato Salad

Use only firm, waxy potatoes. Boil them in their skins in salted water, peel them, and cut them into cubes. Rub the salad bowl with cut onion or garlic and put the potatoes into it while they are still warm. Mix in dressing, then sprinkle with chopped parsley and black pepper. Turn once more. Let the salad get thoroughly cold. Mix again before serving.

Russian Salad

Cut cold cooked carrot, beetroot, turnip, and french beans into conveniently sized pieces. Add cooked peas and a finely chopped young onion. Mix with dressing, sprinkle with chopped parsley, turn once more.

Tomato Cups

Skin the tomatoes and scoop out some of the centres. Season with pepper, salt, finely chopped onion, and a few drops of olive oil. Fill them with diced french beans, carrot, beetroot, potato, and a few peas lightly dressed with oil and vinegar. Sprinkle with finely chopped caper and gherkin.

Tomato, Beetroot, and Cucumber

Peel the cucumber and cut it into thin slices. Put these in a colander, sprinkle them with salt, and allow to drain for an hour.

Pass them and sliced tomato and cooked beetroot through dressing. Place beetroot at the bottom of a dish, then the cucumber, and last the tomato, with a sprinkling of finely chopped onion between the layers. Place finely chopped parsley on top.

How to Clean a French-polished Surface

A FRENCH-POLISHED surface is very easily spoilt and great care must be taken with both its cleaning and polishing. Liquid polishes are more satisfactory than semi-solid.

The following apparatus is necessary: Two soft clean dusters, a bowl of warm soapy water or warm water and vinegar, a soft flannelette cloth, a clean linen cloth, a soft rag, and furniture polish.

If the surface is dirty, wash it carefully with a soft flannelette cloth wrung out of warm soapy water. Then rinse the surface with clean warm water and dry it with a soft linen cloth.

If the surface is finger-marked but not otherwise dirty, wash it with a cloth wrung out of warm water and vinegar (3 tablespoons of vinegar to 1 pint of water).

Polish the surface with furniture polish, applying a small quantity only and rubbing well with the rag. Finish off by polishing it with the two soft dusters, one to remove any polish and the other for the final buffing.

—MAUD B. STRAIN,
Field Officer in Rural Sociology,
Department of Agriculture,
Dunedin

A Picnic Tablecloth

OUTDOOR meals are popular at this time of the year, but, unfortunately, absolutely still days when the tablecloth can be expected to stay in place are apt to be rare. If a small pocket, which can be made in a contrasting fabric and appliqued in place if desired, is stitched to each corner of the cloth, it can readily be filled with weights or stones and so held firmly in place on the windiest of days.

—EVELYN E. MOORE,
Field Officer in Rural Sociology,
Department of Agriculture,
Palmerston North

Raising Bedding Plants for Spring Flowering

THE flowers have scarcely faded from spring bedding plants before the home gardener is sowing the seed for the following season's display. In this article by J. P. Salinger, Horticulturist, Department of Agriculture, Wellington, details are given of the most suitable methods of raising plants to flower the following spring. The section on work in the flower garden in January is by K. H. Marcussen, Horticulturist, Department of Agriculture, Christchurch.

WHETHER one lives in Auckland or Invercargill the colours of spring flowers cheer the gardener after a cold, wet winter. Bedding plants are especially important at this time, for the plants in the herbaceous border are only just starting into growth, and the beauty of flowers like tulips or flowering trees and shrubs is greatly enhanced by underplanting them with suitable bedding plants.

The range of plants is so wide that both shady and sunny portions of the garden can be planted and a variety in colour and habit of growth can be obtained.

Some plants which do well in the colder areas are unsuitable for the warmer parts of the country and many that are grown in the north are frost tender or are normally grown for summer bedding further south. Provided this is kept in mind, there is every chance of success, and a visit in spring to local botanical gardens will often suggest suitable combinations of colours or previously untried plants. It is quite easy to grow plants from seed in spring, but in summer much more care must be taken not only because the seed-bed can dry out very quickly but also because the seed of many of the plants is very small and must be very carefully sown and tended. Anemone and ranunculus can also be raised from small corms.

Many of the plants listed in the chart on page 629, if sown on the earliest date given, will flower in winter during a mild spell of weather. However, the time of planting out will depend on the weather in late summer and early autumn and the onset of severe frosts. Many summer bedding plants will flower until late in the season, and if winter flowering bedding plants are wanted, the beds must be cleared in good time. This means either that plants which flower for a short time only should be used for summer bedding or that the display must be discarded while it is still attractive, but to give a show in spring they should be planted and treated as described.

[*Elliott*

Calendulas, commonly called pot marigolds, provide a good display in winter and spring.

Where facilities are available the seed of plants such as Iceland poppy, cineraria, and *Primula malacoides* should be sown in seed boxes filled with a good soil mixture. This should contain a high proportion of organic matter and coarse sand and the John Innes seed sowing compost provides the ideal conditions. This is made up of the following materials:—

2 parts of loam (preferably sterilised)
1 part of peat or leafmould
1 part of coarse sand or fine grit or scoria

To each bushel of the mixture add 1½oz. of superphosphate and ¾oz. of garden lime.

The soil mixture should be just moist enough to hold together when squeezed in the hand without any moisture oozing out; when this compressed soil is dropped on to a hard surface it should break into small particles. Once the soil mixture has been made up it should be sifted through a ¾in. sieve. The coarse material remaining on the sieve can be placed in the bottom of the box. This should then be filled to the top with sifted soil, which should be firmed with the fingers, especially along the sides and at the corners. More soil should be added, if necessary, and firmed so that the surface is about ½in. below the top edge of the box. Finally the soil should be lightly pressed with a wooden float to obtain a smooth, level, evenly compacted soil.

The seed should be sown thinly in the seed box and lightly covered with soil. The best method of watering a freshly sown box is to place it in a tray or bath of water which reaches to within ½in. of the top of the box. When the surface is seen to be uniformly moist the box should be taken out and allowed to drain, set in a shady position outdoors, and covered

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with an inverted seed box. Glass is unnecessary and paper usually blows about and can be destroyed by wind and rain.

Another method of raising plants from fine seeds is to sow the seed on sphagnum moss. The sphagnum should be rubbed through a ⅜in. sieve, pressed down into the seed box, and then covered with a thin layer of moss rubbed through a ¼in. sieve. The box and moss should be thoroughly soaked with water and the seed sown thinly on the surface. The box should be placed on the south side of a fence or wall and covered with an empty, inverted seed box. Once the seed has germinated the upper box should be removed and the seedling box watered only when the surface starts drying out.

When the seedlings are large enough to handle they should be pricked out into a shaded well-prepared bed in the garden and protected for 3 or 4 days by scrim or brush wood laid on a wire framework placed above the seed-bed. When ranunculus and anemone are raised from corms they should be dusted with thiram dust and planted 54 to a seed box in a good soil mixture. These boxes also should be kept in a shady position and kept moist but not soaking wet until the plants are ready for their final positions.

The majority of plants can be raised by sowing them in a seed-bed in the garden. The bed should face south or south-east and be prepared away from a hedge or trees; otherwise their roots will dry out the soil and rob it of nutrients. If a shaded position is not available, a framework of wire should be erected over the seed-bed, and lathes, scrim, or brush wood laid over the wire. If seed is sown in a frame, the glasslight or sash will not be needed, but should be replaced by these shading materials.

Scrim blind on a roller to shade a newly sown seed-bed.

After the site has been chosen the soil should be lightly forked over and organic matter added. This can be well-rotted compost, leafmould, or moist peat. On a heavy soil or a silty soil which tends to pan or seal over when wet, the surface should be covered with a thin layer of coarse sand, fine grit, or scoria. A dressing of superphosphate at 1oz. per square yard should be dusted over the surface and the soil worked down finely with a rake or a fork.

Most of the seeds will be sown in the new year. If the bed can be prepared before Christmas and left to settle, weed seeds will start germinating and these seedlings can be killed before emergence by raking the soil again 2 or 3 days before sowing the flower seeds. In fact if the gardener is away in the early part of January, it is a great advantage to have the bed prepared ready for sowing before the holidays. There will be many other

[*Elliott*

Left—An informal spring bedding scheme of polyanthus, sparaxis, and myosotis. Right—Cinerarias are excellent bedding plants for comparatively frost-free areas. They grow well in a shady position.

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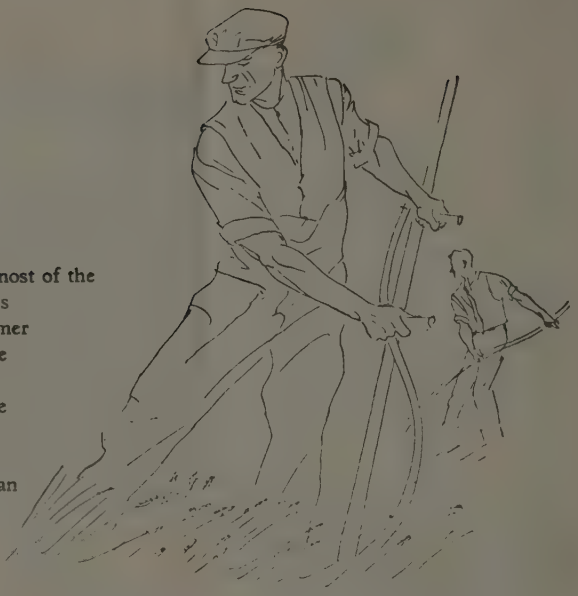

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A Selection of Spring Flowering Bedding Plants

Name	Colour	Height in.	Sowing time N.I.	Sowing time S.I.	Method of raising: Seed box	Method of raising: Seed bed	Need transplanting	Final position: Will tolerate Sun	Shade	Av.	Seaside	Dry	Soils: Will tolerate Moist	Av.	Sandy
Anemone (corms)	Red, blue, purple	9	Feb.-Mar. Apr.*	Jan.	x			x	x	x			x	x	
Antirrhinum	Various	to 15	Mar.-Apr.		x	x		x		x	x	x		x	
Auricula	Various	9		Nov.-Dec.	x	x			x	x			x	x	
Annual carnation	Various	15	Dec.-Jan.			x		x		x	x	x		x	x
Calendula	Yellow	12	Mar.-Apr.	Mar.		x		x		x	x	x		x	x
Cineraria	Blue, red, white	18	Feb.-Mar.		x	x			x	x			x	x	
Double daisy	White, red	6		Jan.	x	x			x	x			x	x	
Iceland poppy	Red, yellow	18	Apr.	Mar.	x	x		x		x			x	x	
Mesembryanthemum	Various	6	Apr.	Mar.	x	x		x		x	x	x		x	x
Myosotis	Blue	9	Feb.	Feb.		x	x		x	x			x	x	
Nemesia	Various	9	Mar.-Apr.			x		x		x		x		x	x
Pansy, viola	Various	6	Mar.	Mar.		x		x	x	x			x	x	
Polyanthus	Various	9	Dec.	Nov.-Dec.	x	x	x		x	x			x	x	
Primula malacoides	Pink, mauve	12	Jan.-Feb.		x	x			x	x			x	x	
Ranunculus (corms)	Various	15	Feb.-Mar. Apr.*	Feb.	x			x		x		x		x	x
Stocks	Various	to 18	Feb.-Mar.			x		x		x	x	x		x	x
Stocks (East Lothian)	Various	15		Mar.		x		x		x		x		x	
Siberian wallflower	Yellow	15		Nov.-Dec.		x	x	x		x	x	x		x	
Sweet william	White, red	9-18	Dec.-Jan.	Nov.-Jan.		x		x	x	x		x	x	x	
Wallflower	Various	to 18		Nov.-Dec.		x	x	x		x	x	x		x	

* In final position.

jobs to do on return, and dry weather may have set in and would hinder the preparation of a good seed-bed.

Care should be taken that the surface is level, as watering will probably be needed, and normally when a can or hose is used more water is applied in a short time than when it rains and so erosion is likely. If the weather is dry at seed sowing time, the bed should be thoroughly watered the evening prior to sowing, and the seed sown the next evening.

Seed should be sown in drills very thinly and if it is very small, it should be mixed with an equal quantity of sand to ensure even distribution. With such seed the drills should be protected by shading, as it should not be sown deeply. Normally if the seed-bed is moist at sowing it need not be watered for 2 or 3 days, depending on sun, wind, and soil conditions. As soon as the surface appears dry it should be watered with a watering can fitted with a fine rose. Many watering cans have a coarse rose which produces a spray which pans and puddles the soil. Where plants are regularly raised from seed a fine rose is a necessity.

As soon as the seedlings appear the shading, if any, can be partially removed and finally taken off when they have produced their first true leaves. The seedlings can be fed by watering them with soluble proprietary fertilisers or by a side dressing of sulphate of ammonia at 1oz. to the yard run of drill hoed into the topsoil.

If the seed has germinated well, the plants will be too close to grow satisfactorily; they should be thinned out to 2in. apart in the row, and these thinnings can be set out in a separate bed to grow on. Wallflowers require a greater distance apart and benefit from complete transplanting, as this encourages fibrous roots to develop. When set out in rows 9in. apart in rows wallflowers will develop into bushy plants by autumn. About a week before they are set in their final position they should be "wrenched". In this operation the spade is set vertically in the soil about 4in. on both sides of the plants and these gently levered up and then allowed to fall back into position. Transplanting can then be done with the minimum of shock to the plants.

During the growing season a close watch should be kept for pests and diseases. Aphis especially can develop quickly to epidemic proportions, but if noticed early can be kept in check with lindane dust or nicotine sulphate at 1 fl. oz. plus soft soap at 3oz. to 4 gallons of water.

If the late summer and autumn have been wet, the summer bedding plants will often continue flowering into late autumn. The gardener must be prepared to harden his heart and remove them in good time, for in the south, especially, spring flowering plants

A visit to a botanical gardens will often show the home gardener the best way of using bedding plants such as these *Primula malacoides*.

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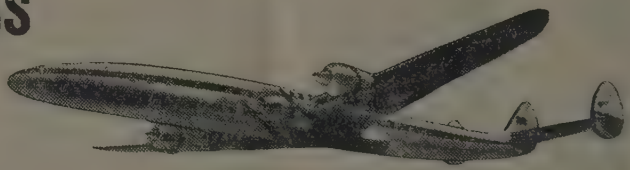

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need to be set out in time to make new roots before the soil becomes too cold.

Frequently the soil will be found to be very dry and compacted after a full season of summer flowers. Rotted organic matter should be dug in at this time and a dressing of fertiliser consisting of 3 parts of blood and bone, 2 parts of superphosphate, and 1 part of sulphate or muriate of potash worked in at 4oz. per square yard. The bed should be well firmed by treading and both the plants and the bed well watered the evening before transplanting.

Use of Spring Bedding Plants

Before purchasing the seed the home gardener should be sure what plants will be required the following season and where they are to be planted. The coloured pictures on the packets of seed often tempt the purchaser to buy unsuitable types or to purchase more than are required, and when planting time comes it is often a problem to know where to put the plants that have been grown.

Spring bedding plants combine well with bulb flowers like tulips, but in the north these are often unsatisfactory or flower too quickly. Narcissus and daffodils can be used for bedding purposes also, but whatever bulbs are grown they should be lifted after flowering and heeled in in another part of the garden to ripen off for use the following season. Bedding plants to combine with these should provide a brief colourful display, so that bulbs and plants can be lifted at the same time.

Though one type of bedding plant by itself can be grown with good effect, a combination of two types will prove even more effective. Spring bedding plants can be planted to fill gaps in a herbaceous or mixed border or planted under flowering trees and shrubs and the following combinations of plants can make a very decorative display in the garden:—

Under Bulbs

Daffodils and narcissus	myosotis
"Pheasant eye" narcissus	red wallflower
Pink tulips	myosotis
Yellow tulips ..	blue violas
Red tulips	white double daisy
Blue iris	yellow violas, bronze pansies
Red sparaxis ..	yellow polyanthus

In Mixed Borders

Antirrhinum, carnation, calendula, Iceland poppy, stock

Combinations of Bedding Plants

Antirrhinums in separate colours

Edging of violas around bed of pansies

Sweet william, Indian carpet around tall sweet williams

Pansies are available in a wide range of colours and are best grown in a bed by themselves.

Alternate plants of Siberian wallflower and bronze or purple wallflower

Bedding Plants for Edgings

Auricula, double daisy, myosotis, nemesia, pansy, and viola

Bedding Plants under Flowering Shrubs

Forsythia	myosotis or blue nemesia
Flowering cherry	polyanthus, *Primula malacoides*
White flowered shrubs	cinerarias
Evergreens	*Primula malacoides*, anemone

The chart on page 629 lists suitable plants, the methods of raising them, and the final positions where they should be planted. With the diversity of climate in both islands of New Zealand it is not possible to be dogmatic as to the suitability of plants for every place. There are many places in the South Island where the climate is as mild as further north; similarly in parts of the North Island severe frosts in winter can damage many plants. The choice of plants marked N.I. is based on the assumption that only light frosts will occur in the area; S.I. plants are chosen for their resistance to winter cold. Local experience is the best guide, but the chart should give a lead as to what should normally be expected to flourish well under conditions of winter cold or where frosts are light and seldom damaging.

Under the headings "final position" and "soils" details are given of the conditions for which plants may be used; for instance, a sandy soil at the seaside is not essential for mesembryanthemums, but these plants will be suitable for such growing conditions.

Garden Work for January

In gardens where it was intended to make the display as attractive as possible for the holiday period, work will consist mainly of attending to watering, if required and general tidying up to keep everything looking the best.

Watering should preferably be done late in the day; if it is done while the sun is strongest, some damage may be suffered by soft foliage.

Those who have been away for a week or two may not have prepared the garden for a show during this particular season and may want to plant up now to ensure a display during late summer and autumn.

For planting out now the ground must be very well watered beforehand and the plants should be sturdy and of good size, though not too large. Suitable subjects which will still give a good show in the garden include French and African marigolds, petunia, *Phlox drummondi*, portulaca, dwarf salvia, and the newer varieties of cosmos; in the colder districts calendula and stock can also be planted.

Bulbs

Spring flowering bulbs which require transplanting can still be lifted if this was not done last month and thought should be given to the planting for next season. Planting is done in most districts during February and

March, but any new bulbs required should be ordered without delay to ensure delivery of the desired varieties, which may not otherwise be available at planting time.

Thought should also be given to the site for planting if this has not already been selected and prepared. Though bulbs do best in a soil containing a good supply of organic matter, they will not tolerate this material before it has rotted down. Fresh animal manure should never be applied just before planting; bonedust is safe to use at any time and can be applied at up to 4oz. per square yard.

Autumn and winter flowering bulbs should be planted now and include autumn crocus, nerines, and lachenalia.

The foliage of the early flowering lilies, for example, *Lilium candidum* and *L. testaceum*, will be drying off by the end of this month and these lilies should then be transplanted, if required. They have no actual resting period and are best shifted as soon as the top growth is drying off. If the flower stems show any sign of infection with fungous disease, they should be carefully removed and burnt. Root growth is still active and care should be taken that they do not dry out while out of the ground. When the lilies are being transplanted the depth at which they are growing should be noted so that they can be replanted at approximately the same level.

[*Photo News*

Christmas lilies are almost dormant for a short time after the flower stem dies down. This is the best time to move them, before new leaves start to grow and the bulbs reroot.

Carnations

Layers of carnation can still be made in the manner described last month. Layered plants should be examined frequently to ensure that the soil round them does not dry out, as root development will then be restricted. Cuttings of perpetual flowering carnations can now be made. The shoots growing on the old flowering stems provide the best material and should be pulled off when about 4in. to 5in. long; the small heel of the old stem should be trimmed up with a sharp knife and the lower leaves removed and the cuttings inserted in sandy soil, preferably in a covered frame or under an inverted preserving jar.

Gladiolus

Gladiolus will be flowering in many gardens and will often be used as cut flowers. It is best not to remove too much foliage when the flowers are being cut, but to leave it to assist in building up the corms for next year's flowering. Spent flowers should be removed early; gladiolus set seed freely and except when planned hybridisation has taken place, seed should not be allowed to develop.

Spraying with DDT or lindane emulsions as controls for thrips should be carried out, even if the plants have finished flowering; a build up of this pest can still take place and can cause damage to other plants in the garden, or may be carried over on the corms to the next season.

Chrysanthemum

Only the very late varieties of chrysanthemum should be stopped after new year. The flowering stems should now be allowed to develop and attention should be given to staking and tying wherever support is required. If specimen blooms are required, the side shoots should be rubbed out as soon as they are big enough to handle; a slight push with the thumb should be adequate. If the shoots do not come away easily, the operation has been delayed too long.

Liquid feeding is most desirable at this stage of growth and should be applied at 7- to 10-day intervals, but never when the soil around the plant is dry. Feeding should be discontinued when the buds show colour.

Roses

In many districts the second crop of flowers is being produced on hybrid tea roses. Unfortunately the flowers do not last long when the weather is very hot and most varieties, if required for cut flowers, should be cut while the buds are fairly tight.

The lasting quality of roses as cut flowers will be greatly extended if they are treated as follows: After the flowers are cut from the bushes they should be placed in water. Each stem should have a small piece cut off the bottom while it is kept under the water. The roses should remain in this container until they have had a good drink, say 1 or 2 hours, after which they can be arranged as desired.

Rambler roses, such as Dorothy Perkins, flower only once in the season. Where growth is vigorous, pruning is best done immediately after flowering and consists of removing at ground level all the canes that have flowered. All the vigour of the plant will then be going into the new shoots and result in better flowering next year. Furthermore, this type of rose is very prone to mildew and by the cutting out of the old wood a source of infection is removed. The better air circulation that results will also assist in controlling disease on the new growth.

Lawns

During the dry periods that often prevail in January and February grass should not be cut too close. The cut on the mower should be set higher. When the weather turns colder and the autumn rains begin the mower may be set back to a closer cut.

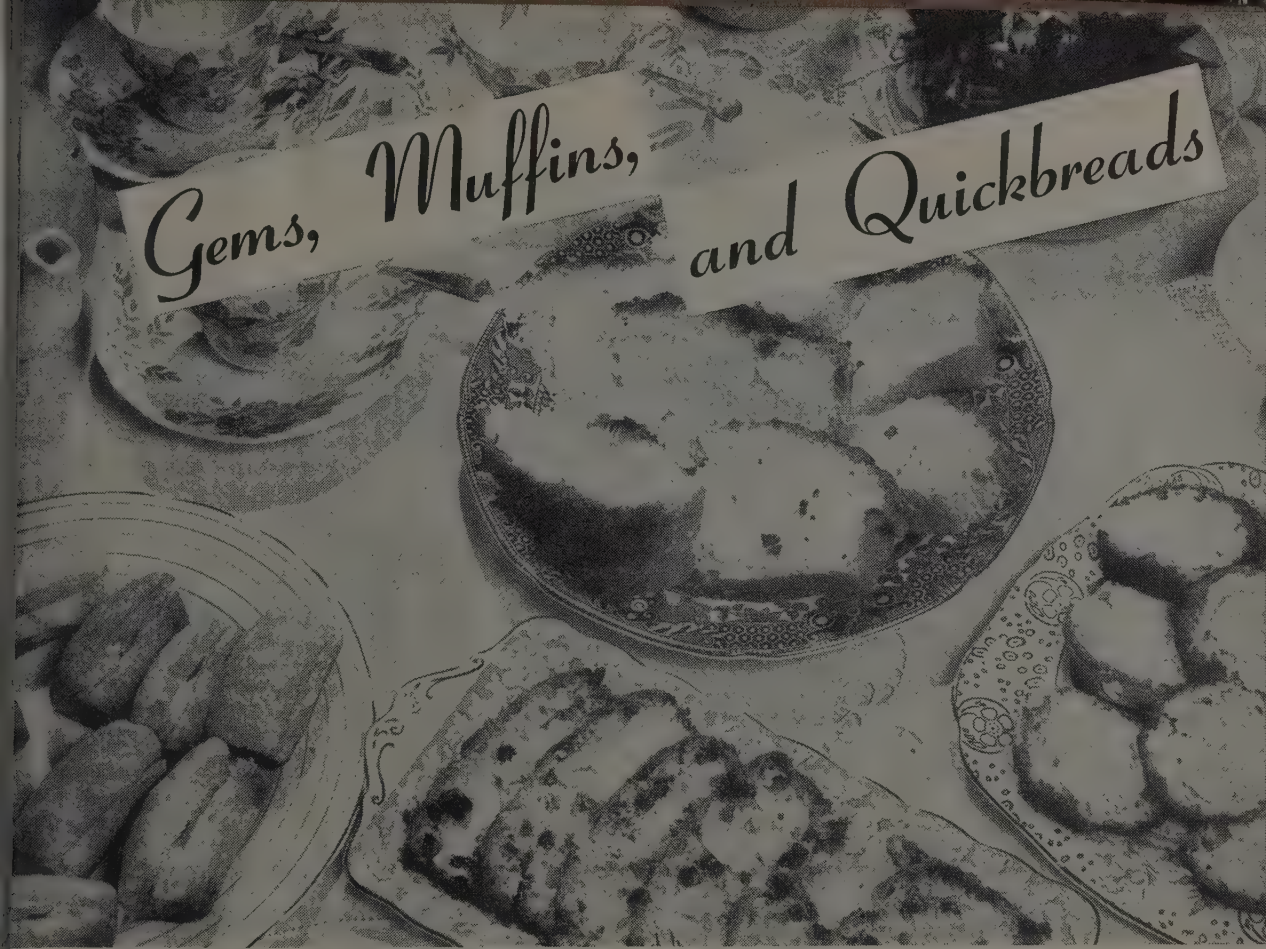
Subterranean caterpillars will become troublesome in many home gardens during late January and February. These live in the ground and come up to feed at night, not only on grasses, but sometimes on plants in borders adjoining lawns. They are easily controlled by an application of DDT. A 50 per cent. preparation should be applied at the rate of 1oz. per 40 square yards and will give protection for several years from subterranean caterpillar and grass-grub.

Cuttings

During January many plants in the flower garden can be successfully propagated by cuttings. Hardened growth should be chosen, never soft succulent shoots; the most suitable are generally the small side shoots on the main branches. Not only plants which are herbaceous in habit can be grown from cuttings, but also many shrubs.

Seed Sowing

Many perennial plants can be raised from seed now and be large enough by autumn to survive winter conditions and many bedding plants, if sown now, will provide a display of flowers for winter and early spring. In the south stock, antirrhinum, and calendula seed can be sown for late autumn flowering; also anemone can be planted, if it is wanted to flower during winter. In milder districts pansy, viola, sweet william, carnation, Iceland poppy, cineraria, and *Primula malacoides* can be sown.



Gems, Muffins, and Quickbreads

By ELEANOR COUSTON,
Field Officer in Rural Sociology, Department of Agriculture, Christchurch

OVEN-FRESH gems, muffins, tea cakes, or coffee cakes will provide a delicious addition to almost any meal, and quickbreads can be prepared in advance and used for several days after baking. There is scope for variety in these quickly made mixtures and success is assured if the ingredients are carefully measured, the instructions followed for mixing, and the right temperature used for baking.

A GENERAL description of mixing and baking methods for the different products is given first and is followed by various recipes.

Gems and Muffins

Gems and muffins are made from the same mixture and differ only in name and in the shape and type of utensil in which they are baked. Gem irons are made of solid cast iron and are heated and greased before the mixture is put in. Muffin tins are more commonly known in New Zealand as patty tins and when these are used they are greased but left cold before they are filled. The final products should be well risen with rounded, but not peaked, tops and golden-brown surfaces. The inside should be fluffy and moist with no large air holes or tunnels.

Mixing

The secret of good gems or muffins lies mainly in the mixing. The proportion of sugar, fat, and liquid is such that over-mixing will make them tough and cause tunnels to form. To reduce the amount of stirring necessary the dry ingredients and the liquid ingredients are mixed separately and usually the fat is melted and combined with the liquids. The liquids are then added all at once to the dry ingredients and the mixture stirred only until it is dampened. Less than ½ minute's stirring is all that is necessary, and though the mixture may not look smooth, best results will be obtained if it is put into the tins at this stage. The batter should not be dropped from the spoon, but the spoon should be placed in the tin and the batter pushed off with another spoon.

HEADING PHOTOGRAPH: The good things shown here can be quickly made and are suitable for many occasions. Centre—Sliced and buttered quick coffee cake. At bottom, left to right—Plain gems, sliced nut loaf, and buttered tea cakes.

Baking

The temperature of the oven will affect the texture of gems and the best temperature is 425 degrees F. The time for baking is from 15 to 20 minutes. If a higher temperature is used, the gems will rise to a peak, form a thick crust, and be small. If the temperature is too low, they will be small, pale, and show large air holes.

Quickbreads

The same method of mixing is used for quickbreads as for gems. The

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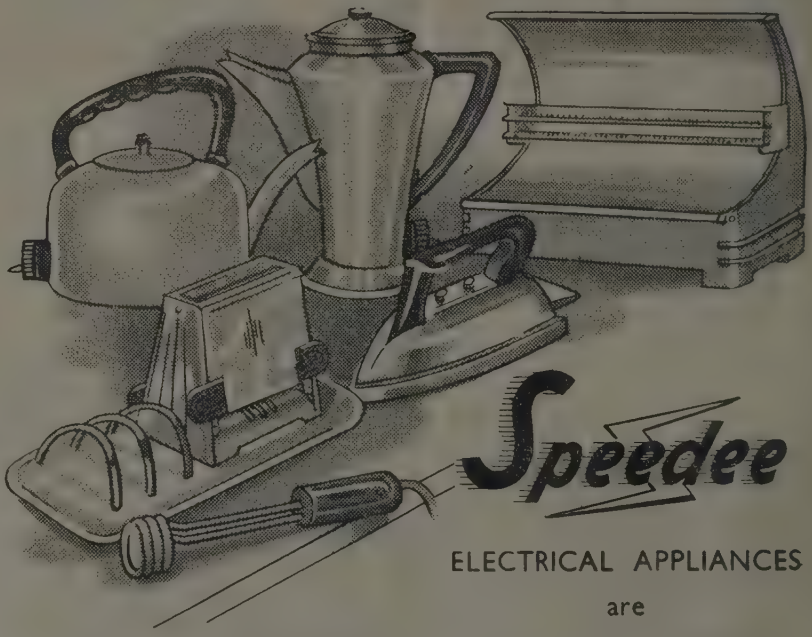

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ICE CREAM

Make a Custard with —
1½ Breakfast Cups Milk
2 Tablespoons Sugar
1 Heaped Tablespoon Edmonds Custard Powder (Vanilla)

Set aside to cool. Whip ½ pint cream and fold into cold custard. Whip again and freeze. When half frozen remove from the tray and beat again. Return to refrigerator and freeze.

JELLY FILLING

(FOR SPONGES AND CAKES)
1 packet Edmonds Jelly Crystals (any flavour)
¾ pint hot water
½ Breakfast Cup unsweetened condensed milk

Dissolve jelly crystals in the water and leave to cool, then add condensed milk. Beat until mixture thickens. Sufficient for two 8 inch sponges.

HOME-MADE LOAF

4 Cups flour
1 Teaspoon salt
Small Cold boiled potato
Milk, or milk and water
2 Raised Teaspoons Edmonds Baking Powder (Sure-to-Rise or Acto)
½ Teaspoon sugar.

Sift together flour, sugar, salt and baking powder, then rub in potato. Add sufficient liquid (about a pint) to make a soft and smooth dough. Mix quickly, put at once into a greased tin ¾ full, smooth top with a knife dipped in melted butter, and bake immediately about ½ to 1 hour in a hot oven (400 deg. F.). Cover over with paper for first 10 or 15 minutes to prevent crusting too soon. When done, take from tin and wrap in a bread cloth until cold.

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liquid ingredients are added all together to the dry ingredients and stirred only until the mixture is dampened.

The correct temperature for baking is 350 degrees F. and the time required is 1 to 1¼ hours.

Recipes

In the following recipes standard measuring cups (8 fl. oz.) and standard measuring spoons are used. All measurements are level.

Gems and Muffins

Plain Gems or Muffins
(yield 1 dozen)

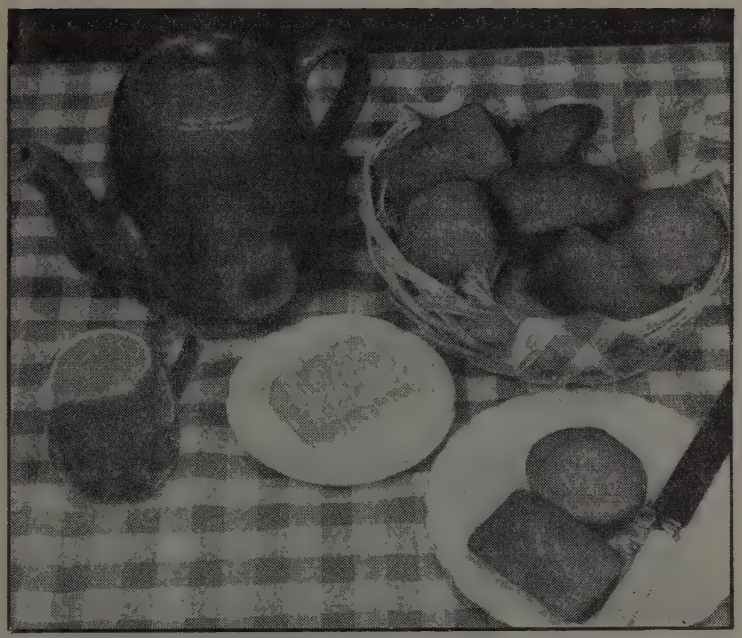
8oz. of flour
1½oz. of sugar
4 teaspoons of baking powder
½ teaspoon of salt
1 egg
1 cup of milk
1oz. of butter (melted)

Sift the flour, sugar, baking powder, and salt into a bowl. Beat the egg and add the milk and melted butter. Mix thoroughly. Make a well in the centre of the dry ingredients. Add the liquid ingredients and stir until the dry ingredients are just dampened. Fill greased patty tins or hot greased gem irons two-thirds full. Bake in a hot oven (425 degrees F.) for 15 to 20 minutes.

Variations: The above recipe may be varied by adding one of the following to the sifted dry ingredients:—

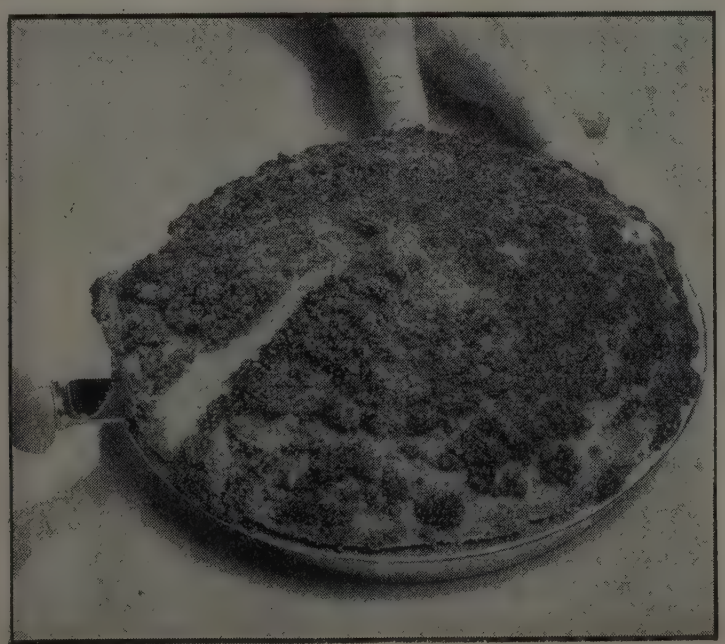
Bacon (add ½ cup, cooked and chopped)

Cheese (add ⅔ cup, finely grated)



[*Oddies*

Ginger gems and coffee go well together for a mid-morning snack.



Quick coffee cake is different and delicious.

Prunes or other dried fruit (add ½ to 1 cup chopped and cooked)

Ground ginger (add 2 teaspoons and blend 2 tablespoons of golden syrup with the milk)

Bran and Raisin Gems or Muffins

4oz. of flour
½ teaspoon of salt
3 teaspoons of baking powder
2oz. of sugar
2 cups of bran
½ cup of raisins
1 egg
1 cup of milk
1oz. of melted butter

Sift the flour, salt, baking powder, and sugar together into a bowl; add the bran and raisins. Beat the egg and add the milk and melted butter. Proceed as for plain gems or muffins.

Ginger Gems
(butter cake method)

4oz. of butter
4oz. of sugar
1 egg (beaten)
8oz. of flour
1 teaspoon of baking powder
½ teaspoon of salt
½ teaspoon of cinnamon
½ teaspoon of ground ginger
½ cup of golden syrup
½ cup of milk
2 teaspoons of baking soda
2 tablespoons of hot water

Cream the butter, add the sugar, and continue beating until fluffy. Add the egg and beat the mixture. Sift the dry ingredients. Blend the golden syrup with the milk. Add the dry ingredients alternately with the liquids to the butter mixture. Dissolve the soda in the hot water and fold into the mixture. Proceed as for plain gems.

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Apple Crunch Muffins

8oz. of flour
3 teaspoons of baking powder
4oz. of sugar
¼ teaspoon of salt
1½oz. of butter (melted)
1 egg
¾ cup of milk
1 cup of peeled, chopped apples

Topping

¼ cup of brown sugar
½ teaspoon of cinnamon
½ cup of chopped walnuts

Sift the dry ingredients together. Beat the egg and add the milk and melted butter. Add the liquids to the flour mixture and stir until the dry ingredients are just dampened. Fold in the apples. Half fill greased muffin tins. Combine the brown sugar, cinnamon, and nuts and sprinkle over the batter. Bake at 425 degrees F. for 20 minutes.

Quickbreads

Sultana and Nut Loaf

10oz. of flour
4oz. of sugar
2 teaspoons of baking powder
½ teaspoon of salt
1 egg
1 cup of milk
1oz. of butter (melted)
½ cup of chopped walnuts
½ cup of sultanas

Sift the flour, sugar, baking powder, and salt into a bowl. Mix in the sultanas and the nuts. Beat the egg and add the milk and melted butter. Add the liquid ingredients to the dry ingredients and mix until the dry ingredients are just dampened. Put the mixture into a well-greased loaf tin and bake at 350 degrees F. for 1 to 1½ hours.

Variations: Other fruits such as raisins, currants, dates, figs, or soaked prunes or apricots or a mixture of these may be used instead of the sultanas and nuts in the above recipe.

Date Loaf

1 cup of dates (chopped)
1 teaspoon of baking soda
1 cup of boiling water
2oz. of butter
¾ cup of sugar
1 egg
½ teaspoon of vanilla
8oz. of flour
½ teaspoon of salt
½ cup of walnuts (optional)

Pour the boiling water over the dates and baking soda. Cream the butter, add the sugar, and cream well. Add the egg and beat the mixture. Add the vanilla. Sift the flour and salt. Add the liquid ingredients alternately with the dry ingredients to the creamed mixture. Bake in a greased loaf tin for 60 to 70 minutes at 350 degrees F.

Wholemeal Date Loaf

4oz. of white flour
1 teaspoon of salt
3 teaspoons of baking powder
1 cup of wholemeal
¼ cup of brown sugar
½ cup of dates
½ cup of chopped nuts
1 egg
1 cup of milk

Sift the flour, salt, and baking powder into a bowl. Add the wholemeal and the brown sugar, which must be free from lumps. Cut up the dates. Mix the dates and nuts through the flour with the fingertips. Beat the egg slightly and add the milk. Add these to the dry ingredients and mix until the dry ingredients are just moistened. Bake at 325 to 350 degrees F. for 1 hour.

Tea cakes should be buttered and served hot.

Quick Coffee Cake

8oz. of flour
¾ teaspoon of salt
2 teaspoons of baking powder
4oz. of sugar
2oz. of butter
1 egg
¾ cup of milk

Topping

2oz. (4 tablespoons) of sugar
2 tablespoons of flour
1 teaspoon of cinnamon
1½oz. of butter

Sift the flour, salt, baking powder, and sugar into a bowl. Cut in the butter or rub it in lightly with the fingertips. Beat the egg slightly and combine it with the milk. Add the liquid ingredients to the dry ingredients and mix as for scones. Spread the dough in a well-greased, 8in.-square baking tin. Prepare the topping by rubbing the butter into the sugar, flour, and cinnamon. Sprinkle the topping over the dough mixture. Bake the cake in a hot oven (400 degrees F.) for 25 minutes. Serve hot either with or without butter.

Cinnamon Raisin Coffee Cake (using white distilled vinegar)

Topping

1oz. of butter (melted)
2oz. of sugar
1 teaspoon of cinnamon
¼ cup of chopped walnuts

Make the topping by combining the butter, sugar, and nuts. Set the mixture aside.

Cake Mixture

10oz. of flour
1 teaspoon of salt
1¼ teaspoons of baking soda
4oz. of sugar
2 eggs
½ cup of raisins
5 tablespoons of white, distilled vinegar, plus milk to make up to 1 cup
2oz. of butter (melted)

Sift the flour, salt, soda, and sugar into a bowl. Beat the eggs, add the liquid, and blend well. Add the melted butter and raisins. Pour all at once into the dry ingredients. Stir until the flour mixture is just dampened. Spread the batter into an 8in.-square tin. Sprinkle the top with the cinnamon and nut mixture. Bake the cake at 350 degrees F. for 45 minutes. Cut into squares and serve warm.

Tea Cakes

(yields 8)

4oz. of flour
1½ teaspoons of baking powder
2oz. of butter
1½oz. of sugar
½ teaspoon of salt
1 egg
Few drops of vanilla essence

Sift the flour, salt, and baking powder twice. Cream the butter, add the sugar, and cream well. Beat in the egg. Fold in the dry ingredients. (If the egg is small, add 1 dessertspoon of milk.) Put spoonfuls into greased patty tins. Bake at 375 degrees F. for 10 to 15 minutes. Split and butter. Serve hot.

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